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X

THE

INDIAN FORESTER.

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A tour in Jaunsar.

April 27th. On the road from Bodyar to Koti-Kanásar, we noticed the natural reproduction of Deodar and Blue Pine, which is particularly good in the lower portions of the Missau block. This young crop is entirely due to fire conservancy, which was instituted in 1872, and it has come up on favourable aspects, and under certain conditions, in spite of grazing. The following reasons are suggested in the Journal of 1891 for the excellence of this reproduction as compared with that in Bodyar :—

" The soil of the Missau block is deeper and contains 'more moisture than that in the Bodyar block. The greater 'amount of moisture is due to the impervious nature of the shale 'or slate in the former block, and to the extremely permeable nature 'of the limestone, which is the prevailing rock, in the latter. Rain 'falling on limestone passes through it at once. The Missau block 'lying on northern and western slopes receives less sun and is 'generally cooler than the Bodyar block, which looks south and 'east. More snow falls on the slopes above the Missau block, this 'melts more gradually, allowing a larger portion of the resulting 'water to infiltrate into the soil and sub-soil. The loss of moisture 'by evaporation is also less.

'Shale decomposes readily to form a soil rich in clay, 'while limestone decomposes very slowly and forms a very shallow 'poor soil, the purer the limestone the shallower the resulting 'soil.

'The altitude is less, the temperature is consequently greater, 'the growth more vigorous and natural regeneration favoured.

'The presence of mature Kail and Deodar trees on the slopes 'higher up in the Missau block capable of producing fertile seed 'in large quantities. The absence of seed-bearers in Bodyar block 'and the thick matted growth of grass which prevents seedlings 'from germinating.

'Deodar is not eaten by sheep when grass is available, and 'there is still plenty of grass in the block. Kail is not generally 'eaten by cattle owing to the great quantity of resin it contains 'and the consequently unpleasant taste of its leaves.'

In the portion below Asmari Chak, we found the annual shoot of deodar in the open to be 24 inches, while that of blue pine was 30 inches. The further we get away from the seed-bearers the less deodar there is in proportion to blue pine, the seed of which is light and is carried further by the wind. It is in these lower portions, where the deodar is not so numerous, that cleanings are urgent, as the principal species is more likely to be suppressed. In 1890, cleanings were undertaken in this block, and now the blue pine are all dead. When a girdled pine is dead, the roots become quite rotten and it is liable to be blown down in a storm, or to be brought down by snow ; we noticed several instances of the latter, and the damage done to the deodar is considerable. Did funds and time permit, it would be better in the interests of the crop to cut down the blue pine, at the time of the cleaning, as the fall of the sapling can then be easily directed ; but as nearly 100 acres of this kind of crop in the Deoban range have to be operated upon every year according to the working plan, it may not be possible to do otherwise than girdle the large saplings.

The wood of the girdled pine has been extensively attacked by the larvæ of a Scolytid beetle ; it is not likely that any sound trees are injured by this insect, we saw no traces of this either last year or this.

At Koti-Kanásar, some of the students girdled or cut down blue pine in the Kophti block below the path to Deoban, and freed 775 deodars ; they also received instruction in Abney's level, as used for finding the heights of trees. The area girdled last year was inspected and it is found that the pine were beginning to show symptoms of decay.

We were there too short a time to count annual rings, but the following measurements were made by the students in 1888 and 1891 :—

In 1888, they counted the annual rings on three deodar stumps close to the camping-ground, with the following results :—

Inches from centre.	*Number of rings.* I.	II.	III.	*Inches from centre.*	*Number of rings.* I.	II.	III.
1st ...	8	11	6	13th ...	14	3	12
2nd ...	5	15	6	14th ...	18	2	5
3rd ...	5	35	6	15th ...	7	4	5
4th ...	3	6	3	16th ..	8	10	8
5th ..	3	2	7	17th ...	10	6	5
6th ...	4	6	6	18th ..	12	5	5
7th ...	5	7	6	19th ..	10	7	4
8th ...	7	3	5	20th ...	9	0	7
9th ...	5	10	7	Add for height from ground	10	10	10
10th ...	4	3	11				
11th ...	6	4	15				
12th ...	6	5	23	Total	159 yrs.	154 yrs.	162 yrs.
Girth					11'	11'-4"	11'
Mean radius					20"	19"	20"
Age when tree attained girth of 6 feet = 11½" radius					58	104	89
Average No. of rings per inch radius					7	7	8

In 1891, the rings were counted on mean radii of 3 Deodar stumps : the results are tabulated below :—

Inches from the centre.	Number of Rings.		
	1st tree.	2nd tree.	3rd tree.
1st	12	9	14
2nd	6	7	11
3rd	12	8	9
4th	14	6	4
5th	6	11	10
6th	4	9	6
7th	3	7	10
8th	3	9	9
9th	4	14	10
10th	3	9	12
11th	2	6	11
12th	4	7	9
13th	4	7	9
14th	3	7	6
15th	3	8	6
16th	4	9	5
17th	5	5	6
18th	8	...	5
19th	4	...	7
20th	8	...	9
21st	3	...	7
22nd	3	...	8
23rd	4	...	6
24th	3	...	10
Add for height above ground ...	5	5	5
Total ...	130	143	205
Mean radius in inches ...	...	16	20
Age when tree attained girth of 6 ft.	71	98	100
Average No. of rings per inch ...	6	9	9

The mean of these observations gives 88 years as the age in which a deodar, in this forest, would attain six feet in girth. The Working Plan calculations, probably made from a greater number of observations, lead to 80 years ; the difference is not great.

The deodar trees in the small temple grove were measured with the following result ;—

	Girth.			*Height.*
1.	18′9″	...	...	122′
2.	15′	...	...	145′
3.	11′2″	...	...	158′
4.	10′11″	...	...	160′
5.	10′9″	...	...	145′

In counting annual rings, the best plan is to measure the longest and shortest diameters, to add them up, and divide by 4 ; then find and mark the mean radius corresponding to this, there will generally be two, and to count and record the rings in every inch. We can thus ascertain the age at which the tree attained any given girth. To arrive at a satisfactory result for any given forest a large number of observations must be taken.

29th April.—March from Koti-Kanásar to Konain ; the path leads through the village lands of Mangtar and Tiuni, and we observed several trees lopped for various purposes, the oaks and *Celtis* for fodder, deodar for litter and manure. The three zones of vegetation were well observed on the hill opposite, spruce and silver at the top on Kanjatra and Kophti ridge, then deodar with its associates blue pine and moru oak, and lower down chir pine with some ban oak. At the bottom of the valley we crossed the Binalgadh and found *Cæsalpinia sepiaria*, *Albizzia Julibrissin*, *Pistacia integerrima*, *Rhamnus persica*, *Rhus semialata* and *Olea cuspidata*. From the Binalgadh to Konain is a stiff climb of some 3,500 feet up a bare hill side.

1st and 2nd May. The monthly oral examinations in Forestry were held on these dates.

We inspected compartment 4, Konain, in which improvement fellings were made last year, the trees being marked by the students in 1891, as follows :—

Species.	Under 1 foot diameter	1-2 feet diameter	2-3 feet diameter	Over 3 feet diameter	Total.	Remarks.
Deodar	1	...	...	...	1	Head broken badly.
Kail	8	6	3	...	17	
Rai and Morinda ...	76	86	49	3	214	
Other species ...	3	3	...	...	6	Chiefly birch.
Total ...	88	94	52	3	237	

The slope is steep (40°) and the aspect N. E.; the crop consists of spruce and deodar, with blue pine, birch, moru oak, and a little silver fir.

The object of the improvement fellings in this forest is as follows :—

(1) to give more space to the crowns of deodar poles and trees by the removal of inferior species, generally spruce, which are crowding them up.

(2) to free deodar small poles and the larger saplings (especially if in groups) by the removal of over-topping spruce and silver fir.

(3) to give more room to fertile deodar seed bearers to enable them to bear seed.

These are the principal objects ; and in cases where we come across groups of young saplings of fir, we may give them more room by removing one or two mature firs around them. All the material can be utilized as fuel, owing to the new road to Chakrata, *viâ* Pandawa.

We marked trees in this compartment as under :—

Kind of tree.	Under 3' girth.	3'—6'	9'—9'	Above 9.	Total.	Remarks.
Blue pine ...	48	21	17	0	86	
Firs ...	30	31	27	12	100	
Deodar ...	1	1	0	0	2	Broken tops.
Miscellaneous ...	1	3	3	1	8	
Dead trees ...	3	10	4	1	18	More dead trees were marked than the No. given here.
Total ...	83	66	51	14	24	

Fire conservancy was introduced here in 1872, and before that, fire must have been severe, as the charred remains of many old trees and the large scars on the upper sides of many standing deodars testify. The Konain forest has been heavily worked in past years for building material for Chakrata, and the supply of green and dry timber to the villagers ; but in spite of these heavy demands, the forest has a grand future before it, as it is well stocked, and consists for the most part of deodar ; there are some splendid deodar thickets with complete canopy.

We examined deodar plantation No. 2 of 1876, in Compartment 4. The place is well drained and sheltered, soil good, aspect N. E. The planting was done close, 5 feet by 5 feet, and the lower

branches are now dead. As an exercise, we pruned off the dead branches up to two feet from the ground. The seeds were sown in the Tika nursery in 1872, pricked out into nursery lines in 1874, and put out in 1876, in pits 5 feet by 5 feet. Measurements made are as follows :—

1885	average height	50	plants	5	ft.	9	in.
1893	„	573	„	13	„	4	„

Some of the original plants which have been allowed to grow on in the Tika nursery are now about 15 feet high. The spot chosen is perhaps too flat for deodar and not sufficiently drained, as these plants do not compare favourably with a similar case in Bodyar (*vide* page 287.)

We examined some instances of plot sowing near the nursery ; the plots are 10 feet by 10 feet scattered about among *Indigofera* and other shrubs, and contain from 6 to 10 plants each, probably 15 years old, the length of the annual shoot being 13 inches.

Another instance of plot sowing is to be found in the Chaulu 'that,' Siari block, where in 1875 a clear felling was made over an area about 600 yards long and 300 yards wide. The aspect of this place is N. E, and the gradient about 25°. A few moru and spruce were left as seed bearers, and immediately under the former, some seedlings of moru may be found ; but otherwise the area was over-grown with willows, poplars, brambles, *Strobilanthes*, and other shrubs, and the reproduction by seed was *nil*. Hence in 1881, plots 5 feet by 5 feet were sown with deodar seed, 500 seeds to a plot ; superfluous plants which came up were used in filling up blanks. We counted 43 plots and found 764 plants, giving us an average of 18 plants in one plot with an average height of 6 feet ; it would be advisable to thin out these plants leaving 2 or 3 of the dominant ones in each plot. This area is interesting as demonstrating how important it is to *avoid* making anything in the nature of a clear felling in these hills.

The Gidhi Khud Coppice of Karshu Oak.

This coppice forms a portion of the Hajawa Forest and is included in a working circle with two detached areas of Karshu as follows :—

Gidhi Khud	12	compts.	38	acres.
Hajawa	4	„	12	„
Jadi	4	„	12	„
Total	20	„	62	„

From the above it will appear that the rotation of the coppice is 20 years, and the average size of the annual coupe 3·1 acres. The elevation of Gidhi Khud is over 9,000 feet and growth at this height is not very rapid ; hence it remains to be proved whether a rotation of 20 years is sufficiently long to yield fair sized fuel.

Alternate compartments are worked in succession, so that the intermediate compartments may afford protection against wind,

frost, &c. and a shelter belt has been preserved along the top of the ridge. Snow is to be feared at this elevation, and we noticed the effects of the late severe winter in the breaking off of the young coppice shoots with the bark of the stool attached.

The standards have been well chosen and are uniformly distributed, with straight stems, and fairly broad, symmetrical crowns which will now expand owing to more room.

Felling, cutting and stacking are done by contract at Rs. 2 per 100 st. c. ft., the contractor being bound to cut below 6 inches from the ground ; the stools are afterwards dressed by daily labour. Only stools of a foot in diameter or less are dressed. The experiment of ringing stools of large trees, instead of dressing them, has been found unsuccessful and therefore abandoned.

It does not pay to carry the small branch wood to Chakrata, and anything under 2 inches diameter is left on the ground. In some places these branches are lying on the coupe in deep masses, not only injuring the shoots, and preventing their growing up, but also preventing the germination of any seed that may be shed. In all our Indian coppices, at some distance from the market, this disposal of the branch wood is a matter of serious difficulty, and merits more attention. Fortunately, in a damp climate, the material soon rots, but not before it has had time to injure the stools.

It is important to notice that the compartments above the road are being worked first, and then will follow those below the road, so that no damage will be done to coppice shoots by logs, trees, &c., falling down on to them from above.

The following table shows the yield of the compartments already cut over :—

No. of Compt.	Date of cutting.	Area in acres.	No. of standards left.	Outturn in stacked c. ft.	Outturn per acre st. c. ft.	Average length of last year's shoot.	Remarks.
2	Nov. 1889	2·5	30	9,700	3,880	4″	
4	Nov. 1890	2·75	50	11,640	4,234	10″	
6	Nov. 1891	4·5	65	11,985	2,663	8″	
3	Nov. 1892	2	50	*5,500	*2,750		*Estimated.

The trees which are being felled now are clearly very much older than 20 years, and it is certain that the yield at the beginning of the next rotation, will fall far short of the present yield which averages up to date 3,382 st. c. ft. per acre. Karshu acorns have been dibbled in some of the compartments already worked over, and have come up successfully. There are so many old stools which produce no shoots that it is obvious something of this kind must be done.

(To be continued.)

Forest Administration in the Central Provinces.

In the last October number of the *Indian Forester* there appeared an article setting forth roughly the "present forest administration of the C. P." ; and making certain remarks with reference to "impending legislation." This article was written at a time when the Local Government had fully convinced itself that some alteration had to be made in the present administration ; and, taking up its stand on the hardships of the agriculturists, and the "Zulum"—to use a well-known Anglo-Indian term—of the Department, it was ready to clutch at any straw, provided it could say that something had been done.

Under these circumstances, there was a fear—a great fear—that the popular cry of the uninitiated for "Commutation" should be accepted. But, as was pointed out on page 418 of the *Indian Forester* for November, 1892, this proposal "which would surely have been a step backwards instead of one of progress" was repeated by the Chief Commissioner.

Since that time much has happened. The reign of Morpheus has truly passed ; and we are now in the midst of the greatest revolution the forest administration of this or any other Province has ever witnessed. In one half of the Province only—to quote the words of those in authority—"over 1550 square miles of forests will thus shortly be provided with working plans" ; actual compilation of the plans being completed by about this time next year.

With reference to the introduction of this scheme I have recently had an opportunity of perusing a most interesting note relating solely—as far as statistics are concerned—to the forest area of the Northern Circle ; though, as far as the scheme is concerned, it is to be applied without modification both in the the Northern and Southern Circles. I had hoped, before this, to have read an account of this revolutionary undertaking in this Magazine : but as nothing has yet appeared, the following notes which I have been able to collect, may be of interest to the readers of the 'Forester.'

I will begin by giving a few statistics, relating only to the Southern Circle, which will aid materially in arriving at an understanding of the scheme ; after which, a short account of the scheme itself will follow.

As a preliminary, it may be of interest to note that the half of the Province forming the Northern Circle, occupies an area of 10,079 square miles, including forest land and cultivation ; and this country is inhabited by a population of 3,476,595 souls, as returned at the last census. Now, the area of the Malguzari and Zemindari or Proprietary Forests, situated in this tract, is given as 11,014 square miles ; so that, supposing the inhabitants to be solely dependent on the private resources of the Province for their forest requirements, it would follow that 1·4 acres per head of population would be available.

Dr. Schlich in his book on Forestry, has stated that for a nation 1 acre per head of population is a sufficient area of forest to meet the requirements of the people. Consequently it would appear that the people are independent of Government Forests. There is reason to believe, however, that the above figures do not in reality express the wooded private areas—that is to say, that in the above figures the word forest must be taken in its very general and widest signification ; and not in the sense, of "woods." And as will be seen from figures given below, there is a decided demand on the Government forests.

Let us turn now to the Government Forests. The total area is given at 10,079 squares miles, which is made up as follows :—

Fire—protected and closed forests	2,822	sq., miles
Area to be excised from Govt., forests	2,249	,,
Open forests	5,008	,,
Total	10,079	sq., miles.

Deducting the area which is shortly to be excised, it follows that 7,830 square miles is the area of Government forests which will be permanently retained by the Forest Department of these Provinces.

Of this 2,822 square miles is the area of Closed forests * and the remainder 5,008 square miles, constituting the open forests, in the area to which the scheme to be described is to be applied.

This area of 5,008 square miles is not, however, wholly wooded and it is estimated that 45% of the total area consists of blanks. From which the following is deduced :—

Area of open forests	5,008	sq., miles
Deduct area of blanks	2,253	,,
Wooded area	2,755	square miles.

Now, in this area of 2,755 square miles, I gather that 4 valuation Surveys by cutting over a total area of 195·5 acres, were carried out with the following results per acre, after leaving 30 standards :—

Produce.	Valuation Survey.			
	I	II	III	IV
	in tons	in tons	in tons	in tons
(*a*) Timber	2	1	6	47
(*b*) Fuel	7	6·24		
Total	9	7·24	6	47

* For definition of "Closed" and "Open" forests, *vide* pages 375 *Indian Forester* for October, 1892.

These results would give an average of 6·7 tons of wood to the acre.

And, therefore, for the purpose of Working Plans, the following average is accepted, after leaving 30 reserves to the acres :—

(*a*)	Timber	1 ton
(*b*)	Fuel	4 tons
	Total per acre	5 tons

Accepting this average yield as correct, we arive at the result that on the 2,755 square miles forming the wooded portion of the "Open Forests" the following is the stocking :—

(*a*)	Timber	1,763,200 tons
(*b*)	Firewood	7,052,800 „
	Total	8,816,000 tons

Now, as to the consumption from these forests, as calculated by the registered sales of the previous year 1891-92, the following is the result :—

(*a*)	Timber	11,352 tons
(*b*)	Firewood	47,816 „
	Total	59,168 tons

Or, reducing this to acres, at 5 tons to the acre, we have that the area to be cut over yearly to meet the demands is equal to 11,834 acres, as compared with 1,763,200 acres of well stocked forest available.

Having said so much by way of preface, it is now time that we turned our attention to the details of the scheme itself. Roughly speaking, it may be stated that the usual practice in preparing Working Plans is to start with a forest—that is with a tract of wooded country of given area; then to divide this area into blocks and compartments; then to fix the rotation; then to determine the yield per acre, and finally to fix the annual cuttings. In the Central Provinces, however, this procedure is to be completely reversed. Above, we have shown that the consumption from the forests of the Northern Circle during the year 1891-92, was equal to 59,168 tons, this quantity being the registered consumption during the year 1891-92, for the whole of the Northern Circle, which is divided into 8 Forest Divisions; these again being divided into so many Ranges. So that the consumption from the Government Forests of each Division, and of each Range is known. Further, in each Range there are a number of licensed vendors whose duty it has been to sell licenses at fixed rates per cartload or headload to the people requiring forest produce, the purchasers being permitted to cut and remove the same from any part of the forest served by a particular license vendor. It follows that not only is the total sale of forest produce per annum from each license vending station known, but also the quantity of produce removed from the heart of Government forest land, for the

extraction of produce from which licenses were sold at a fixed license vending station.

Now, this knowledge may be called the foundation stone of our scheme; for, not only does it aid materially in determining the number of working circles which are to be established in any Range, the working circle being so fixed and in such number that no inconvenience is to be caused to the people in carying produce removed from the annual cuttings, for long distances to their homes; but this knowledge is indispensable for determining the size or area of annual cuttings, and of working circles, in a manner which will now be described.

For the purpose of introducing this new scheme the first thing to be done is to determine the annual yield which is required from a particular tract of forest—that is to determine the consumption in tons during the year 1891-92 from this tract. This information in cartloads and headloads, is obtained in the manner just explained from the license vendor, who has been selling licenses for that particular tract; and on the assumption that 1 ton=3·3 cartloads=36 headloads, the tonnage follows.

The yield which the annual cuttings of the working circle, which it is proposed to establish in a part of a Range, that is, the registered quantity yearly consumed in the tract having thus been fixed, it has been thought expedient to add to it 50% "to meet the 'more than probable increasing demands which are certain to be 'made on the forests if the selling rates are lowered." And now by dividing the resultant figure by 5—(*i.e.* 5 tons, the average stocking of the open forests of the C.P., as above explained)—the number of acres of wood which require to be felled to yield the estimated out-turn is determined.

The next and final step, the fixing of the working circle, is quite as simple. It has been shown above that "45 per cent of the total area of the open forests consists of blanks" consequently as the rotation is fixed at 30 years for the following reasons, namely, "that the coppicing faculty of the several species to be dealt with is 'not lost but is well maintained within that age even extending up 'to and beyond 50 years in most species. Teak coppices fairly well 'up to 50 years; so do sal, lendhya, mohwa, sirioa and numerous 'others which yield valuable timber and other products"; the idea being to produce poles from 9 to 12 inches and up to 18 inches girth, such poles "being in greatest demand by the people, as 'with them they build their houses, fence their fields, and 'employ them as supports for sugar-cane crops"—it follows that by multiplying the number of acres thus found by 54·54, (*i.e.*, 1 × ·818 × 30 = 54·54), the area of the required working circle will be derived.

The following example will, perhaps, best illustrate the method:—

Suppose that the registered consumption of wood for the locality in the years 1891-92 was 10 tons, 50 per cent added would

raise this to 15 tons. The required area of forest expected to yield 15 tons or the average rate of 5 tons per acre will be 3 acres, then 3 multiplied by 54·54=163·62 acres will be the area of the Working Circle.

The area of the required Working Circle having thus been fixed, theoretically, it is in the next place to be laid down, practically, on the ground—a portion of forest of the required area of the Working Circle being carved out from the existing forest area. This being done it only remains now to say a few words with reference to the method of treatment and the method of conducting the fellings. From what has already been said it will have been gathered that the "method of treatment" or sylvicultural system is to be that of coppice with standards, the number of standards being fixed at 60 to the acre, besides all trees having a circumference area of 3 feet. The rotation, for reasons above given, is fixed at 30 years.

As to the method of conducting the fellings, the period of 30 years is to be divided into 2 periods of 15 years and the fellings will be conducted on the method of strips, 5 chains broad, and not more than 20 chains in length, the trees on every alternate strip being left standing, each strip and alternate belt of trees thus being of equal width occupying equal areas. That is to say that perfect parallellograms 5 chains broad, 10 to 20 chains long, are to be laid down on the ground, and cut alternately. The entire area of the Working Circle will thus be gone over during the first 15 years, and in the 16th year the fellings will recommence, the alternate belts being then felled—and so on to the 30th year.

In conclusion it is only necessary to say a few words with reference to the effects of this new scheme in upsetting the old system of management. In the old days the person requiring a forest produce had merely to purchase a license at the nearest license vending station and armed with his license and his axe he had the run of the whole forest wherein to satisfy his desires. There was practically no check and certainly no system.

By the introduction of the new scheme above described all the Government forests will be closed and reserved, with the exception of the annual cuttings, that is the strips which are to be annually felled and from which alone green wood is to be obtainable: the license vendor residing on the site of the cutting area, in order that no great inconvenience be caused to the people dependent on the Government forests, their produce for the annual fellings are to be fairly close together; and in fact the number of working circles which have been established in the different Forests Divisions would appear to vary from 30 to over 60. For these, working plans are to be prepared at once, and in the words already used above, over "1,550 square miles of forest will thus 'shortly be provided with Working Plans"; "the actual compilation

of Plans being completed by about October 1893. Thus we have to contemplate the following mysteries. To begin with, a Province, which has an area of Government Forest equal to x acres which have been worked for over 30 years without even the elements of a Working-Plan being thought necessary; though a consumption of about y tons has been the average yearly quantity of material removed from these forests, the whole of this produce having been extracted at the will and pleasure of the purchaser from any part of a Government Forest without let or hindrance: suddenly, in a single year, from the Government forests of this Province not a single stick will be removed except in accordance with the provisions of a Working Plan.

In this article, only a rough description of the scheme which is now, it is understood, in working order, has been given. Details have been omitted, as being, perhaps, tedious and unnecessary to the understanding of the scheme itself. Similarly, all criticisms of the scheme have been avoided: though both these matters might well form the subjects of special articles.

TUSCAN.

Forest Conservancy in the Catchment areas of tanks.

An interesting discussion has lately taken place on the advantages and disadvantages, from the point of view of water supply, of fostering woody and herbaceous growth in the drainage area of the Danta tank in Ajmere, where the climate is dry, evaporation great, and the rainfall slight and uncertain in its character. It has been found impossible, in this case, to arrive at fairly reliable conclusions; but the general question does not appear, in India at least, to have ever been systematically investigated. Should any of our readers have had special opportunities for observing how forest conservancy in such a climate affects, in loose dry soils, the retention of water on sloping ground, the record of their views in this journal would no doubt be of advantage in elucidating the question.

The tank alluded to was completed in 1878. It is situated among low steeply-sloping hills in a very dry climate, the average annual rainfall being about 16 inches. The drainage area extends over about 3 square miles, the whole being a rocky basin, covered thinly with a light sandy soil. The vegetation, when protected, is of the poorest kind—low stunted trees or shrubs, with grass, much of which disappears in seasons of drought. The forest growth in the catchment area was first conserved in 1880, and has since been uninterruptedly protected. Conservancy was undertaken because

it was confidently expected that, not only by this means would the silting-up of the tank-bed be impeded, but, more especially, that the brushwood and grass would enable a greater percentage of the total rainfall to reach the reservoir, by diminishing evaporation and by causing water to flow off the slopes less rapidly and to continue flowing for some time after the cessation of rain. The assuring of a slow and continuous flow, provided that the total in-take of water in the tank is not thereby much reduced, would be, in this case, of special importance, as evaporation from the tank surface is probably greater than when the water is flowing towards the reservoir. In 1892, however, after 12 years of forest conservancy, it was reported that the tank had dried up, and it was proposed to permit thenceforward unrestricted grazing and the cutting of bushes during the greater part of each year in the area drained by the tank. It was argued that the effect of forest conservancy was, by retarding the flow into the tank, to increase the loss by evaporation. This argument was founded mainly on the accepted fact that, in previous years, the tank had only been filled after very heavy rainfall. No proof was adduced that the in-take of water would have been greater had the vegetation not been protected ; but it was roundly stated that the drainage area would be best adapted to its requirements were the whole surface covered with a smooth impermeable substance, such as asphalt. Before coming to a conclusion, the local authorities undertook a further enquiry as to the circumstances of the reservoir, and the effect which the presence or absence of forest growth has on the quantity of water actually becoming available in that and other local tanks similarly situated. The result of this enquiry is that *data* are not available on which the matter can be set at rest. The various officials consulted are fairly evenly divided in opinion : some considering, for instance, that, when the rainfall is slight, the water has a better chance of ultimately reaching the tank if the vegetation on the hill slopes is protected ; others condemning forest conservancy as an unmixed evil from the point of view concerned. The course finally adopted has been to defer the settlement of the question for a short term of years, during which the quantity and character of the rainfall and other particulars will be systematically observed and recorded. Although the discussion has been hitherto to a great extent based on academic considerations, it has raised an interesting question which, in some localities, must be of considerable economic importance. There are many localities in Southern India which must be very similar to that in Ajmere, where tanks surrounded by hills which have been taken up as Reserves might be expected to give information. Most especially are such localities common in the Ceded Districts and we hope some of our readers in those Districts will give us their experience. And as regards the Danta tank, the results of the experiments to be undertaken will influence the solution of similar problems in various parts of India.

Charcoal for Iron Smelting.

In the annual report of the Geological Survey of India for 1892 it is stated with reference to the iron-ores of Southern India that the question of the successful development of the enormous iron-ore deposits of the Salem District becomes eventually a forest problem, as there is no coal in the district and no immediate prospect of profitably using for this purpose, on account of heavy transit charges, the coal raised in other Provinces. It may be urged that it by no means follows that because an iron industry cannot be developed owing to the costliness of coal, charcoal can therefore be made available at a sufficiently low-cost to float the industry. But it certainly behoves the Forest Department to put forward such a report of its resources, and possibilities, as will distinctly show to what extent, both as regards material and as regards cost, it can contribute towards the utilization of the ore.

In view to this, the first information required seems to be a reliable statement of the quantity of charcoal required to produce a ton of iron. Such authorities as Sir Dietrich Brandis and Dr. Schlich pronounced this to be 2½ to 3½ tons, and their statements, have so far as we know, remained unquestioned, up to the appearance of a letter in the *Pioneer* by Mr. Charles McMinn, dated 20th March last, in which it is said :—" In the Blandfer furnace, writes 'Greenwood, page 134, the consumption of charcoal is 16¾ cwt. per 'ton of pig produced." The actual experience of our readers is earnestly sought in order to reconcile these different authorities, Our limited acquaintance with the subject of iron smelting goes to show that in a rule of thumb sort of measure equal quantities by weight of ore and charcoal are used, and that it is more likely that 16¾ cwt. of charcoal are consumed in a Blandfer furnace to smelt a ton of ore, than to produce a ton of iron.

Then comes the question of the yield of the ores. In Watt's Economic Dictionary, we find that Salem magnetite containing 17 per cent. of metal yields by the methods in vogue only 15 per cent. Can 50 per cent. be obtained from the richest ores with an expenditure of charcoal of two tons to one ton of iron produced ? Or can better or worse results only be obtained?

With further reference to Mr. McMinn's letter above quoted and which is reproduced below* it may be safely asserted that the constituents of wood absolutely dispose of the matter of obtaining by any process of carbonisation more than 25 per cent. of the wood by weight in charcoal. The usual result, under favourable conditions, is 21 or 22 per cent. of charcoal.

Finally, it may be said that the yield of forests so differently situated as those of Madras and Russia can scarcely be compared. Full complete forests in Europe may produce a ton per acre per annum, and we have forests in India which produce that amount,

such as our richest and best stocked Sal forests of the Himalayan Terai, but whether the forests of Salem or the Boswellia mixed forests of Central India actually produce one-half or one-tenth that amount of wood is for our readers in those localities to show, and we trust they will come forward and clear up this point.

The charge made against the department in regard to its *cherished wood* may be dismissed with the remark that the department is ever ready to find an outlet for its products at a profitable rate. If Metallurgy or any other industry can offer value for wood either at present existing, or to be grown in the future, the financial and commercial abilities of the Forest Department which have always been rated highly, will not fail to meet such an offer in a liberal and business-like way.

H.

*IRON MANUFACTURE IN INDIA.

To the Editor.

Sir—From the threepenny handbook of commercial products, No. 8, Iron, published by the Government of India, I learn that Government officials seem to be labouring under erroneous ideas touching the effects of iron working upon forests. We are told at page 14, apparently on the authority of Sir Dietrich Brandis, that 10,000 tons of iron require 35,000 tons of charcoal, to be produced from 140,000 tons of wood, which, at the rate of half a ton per acre of annual yield, require 280,000 acres of forest. During a long career of respectful criticism of official literature, I have ever submitted that Indian officials will make grave mistakes and fall into perilous delusions if they refuse to peruse and digest the non-official literature of their subjects. Now we can understand from these figures why the Indian Forest Department has, though graciously disposed, still hung back when asked to make concessions for iron manufacture. Twenty-eight acres of forest for each ton of pig! So far as I can judge from the authorities within reach, each one of these three statements largely underestimates the productive power of each several factor. We are told that an acre of forest only produces half a ton of fuel annually, that eight acres will be required for one ton of charcoal, and three and a half tons of charcoal, or twenty-eight acres, for one ton of iron. The best authority on the subject, Jeans, states that each blast furnace requires at least 20,000 acres of forest for fuel in Russia=see page 262—and every modern blast furnace turns out 10,000 tons per annum as a minimum. In the Blandfer furnace, writes Greenwood, page 134, the consumption of charcoal is 16¾ cwt. per ton of pig produced. As for the half ton of wood per annum per acre, when root crops at home yield 10 to 50 tons, I am silent. Dr. Schlich—see article Charcoal, Watt's Economic Dictionary—though himself a forester anxious for his charge, estimates the charcoal required per ton of iron at 2½ not 3½ tons. At any rate, if 20,000 acres of forest suffice in Russia and India, where reproduction is far more rapid, a much smaller area should be ample. Years ago, I pointed out in your columns that the best Jabalpur iron was made with bamboo and Boswellia, which were waste products over vast areas of our forests. I submit that the statistics circulated by Government in the threepenny handbook are calculated to discourage Indian metallurgy, though probably the intention of its author was quite the reverse. Of course the Forest Department will be hostile when told that 280,000 acres of their cherished wood are wanted for each blast furnace; they would be friendly, probably, if informed that 10,000 acres was, at any rate, much nearer a sober estimate.

CHARLES W. McMINN.

II.—CORRESPONDENCE.

Deodar in Kulu.

SIR,

I have read with much interest your correspondent's letter on "Deodar in Kulu" contained in the Indian Forester for May, 1893 and beg to make the following remarks on some of the points discussed in his paper. I am glad to note the great importance placed by your correspondent on the element of shelter, and I also am of opinion that too much stress cannot be placed on this important condition. In my opinion (based on 10 or 12 years' experience of Deodar planting and sowing in the Himalaya) it is almost useless to attempt to grow Deodar successfully on bare hill sides out in the open, but where shelter is available, even though the soil is poor, the successful planting and sowing of Deodar is generally successful. The first thing to be done in the case of the treatment of bare places is to get up some kind of shelter either from Blue Pine (*Pinus excelsa*) or such bushes as *Indigofera*, *Desmodium*, &c., under whose fostering care there will be no difficulty in inducing Deodar to grow. The lateral shelter of old Deodars and of Oaks and other trees is also good when available. In all Deodar planting work and in fact as a general rule, with regard to all planting operations in this country, another great secret of success lies in using good, strong nursery plants, not less than 10 inches high, and which have been transplanted at least twice in the nursery beds before removal to the Forest. In the case of Deodar, these can be planted during the rains with or without balls of earth, but the planting work should all be completed by the middle or at the latest the end of July so as to give the plants a fair chance of establishing themselves before the rains are over. A system of transplanting Deodar in baskets has been lately introduced into this Division by the Conservator and which, though slightly more expensive than the old plan of planting out direct, has the advantage of ensuring almost complete success. This plan may be described as follows:—

When the young Deodar plants are 18 months old and after having been pricked out once in the nursery beds after 6 months, they are transplanted during July into Bamboo or Ringal baskets 8 inches by 4 inches and placed in a shady place in the nurseries. These are occasionally watered during the autumn and are ready for planting out during the succeeding March and April, when just 2 years old, by which time the roots begin to appear outside the baskets. The baskets soon rot, the plant establishes itself at once

and very few failures are the result, probably not more than 5 per cent. As in Kulu, so in Jaunsar, there was a splendid crop of Deodar seed during November 1892, and this has resulted in a magnificent crop of seedlings wherever suitable conditions exist. Your correspondent altogether condemns sowing of Deodar *in situ*, but I may say that some success has been obtained with sowings in patches and pits in the forests of this Division, wherever the conditions of soil, aspect, elevation and shelter were favourable. One advantage is that the system does not cost much, and in a good seed year, one can often use up a quantity of seed which could not be otherwise utilised. I quite agree with your correspondent in his remarks about the trifling damage done by limited cattle grazing in Deodar forest, and have often noted that a much better crop of seedlings is generally forthcoming in lightly grazed areas than in the strictly closed and fenced forests. Goats and sheep undoubtedly nibble the Deodar seedlings and as they do not assist in breaking up the turf, these animals should not be allowed in to browse in any Deodar forest under reproduction. The damage done by Buffaloes is also considerable, as they trample down the seedlings and knock about and bark the saplings with their horns, so they two should not be allowed in young Deodar forests but with cattle I consider a moderate amount of grazing an advantage.

E. Mc. A. M.

An important question of Forest Law.

SIR,

Will some of your readers learned in Forest Law give us their valuable opinion, or others who may have tested the point their experience, in regard to the enforcement of the obligations imposed by Sec. 78 of Act VII of 1878 (The Forest Act)? Sec. 78 requires that certain persons shall furnish information respecting the commission of Forest offences, and also render assistance in certain cases, when called upon; but it specifies no penalty or punishment in the event of neglect or refusal to fulfil the obligations.

The question has arisen whether the non-fulfilment of these obligations is punishable at all, and if punishable, whether it can be dealt with under the Forest Act or under the Indian Penal Code.

Various arguments have been advanced, and views expressed tending to show that the failure to punish information, or to render assistance must be held to be an 'offence'; but these still need the confirmation, so far as we know, of a conviction under either Sec. 65 of Act VII, or Sec. 187 of the Indian Penal Code. which shall stand the test of Appeal to a higher Court.

Pending such authoritative decision by the Courts, it seems to us that the non-fulfilment of the obligations imposed by Sec. 78 may be fairly treated as a 'Forest offence', for, if it is not a 'Forest offence', it would appear not to be an offence at all, which

would seem absurd, and to exempt it from the provisions of Sec. 187 of the Indian Penal Code. In this view the 'offence' could be compounded by a Forest Officer specially empowered under Sec. 67 of Act VII or it could be punished under Sec. 65 of the same Act.

At all events, where the offender is willing to compound, the use of Sec. 67 would seem to be unobjectionable, since in the event of his refusing to pay compensation, he can be prosecuted under both Sec. 187 of the Indian Penal Code, and Sec. 65 of Act VII.

H.

Results of Eucalyptus cultivation.

SIR,

Since the fiftieth year of this century and during several years' field studies before that time, I have exerted myself for the introduction and extensive cultivation of the *best* species of Eucalypti as adapted for various regions of the globe, not only through the elaboration of extensive works but also by distributing select seeds of the various specific trees, as well for industrial, as for sanitary purposes. Late in life, it would be a pleasing satisfaction to me, if I could learn of particular successes anywhere in these rearings, so largely called forth by myself without personal advantages of my own.

As regards Continental India, I am aware that the Eucalypti have become of extraordinary value; also in the Peshawar and Lahore Districts they have proved useful to subdue fevers and to provide timber and fuel; so, it would probably be of great interest and serve further useful purposes, for those living far away, if some detailed information could, in reference to your provinces, be afforded through your excellent periodical, which valuable publication I regularly receive through your generosity. May I also draw your attention on this occasion to the immense successes attained in many tracts of South Africa right to the Transvaal, with two of the principal Australian bushes mentioned in my "Select Plants" as particularly recommendable, namely, *Atriplex nummularia* and *A. halimoides*, which perhaps are also now gregariously naturalized in the Punjab and Peshawar.

My Iconography of Australian Salsolaceous plants (quarto, 96 plates) will doubtless be accessible to you.—A rather full account of the pastoral rearing and spreading of the two mentioned Atriplices is given in one of the last numbers of the Agricultural Journal of Cape Town and by the venerable and erudite Professor McOwan, who alludes to the intelligent and zealous co-operation, so far, of numerous South African Colonists.

MELBOURNE,
June 24th, 1893.

Regardfully yours,
FERD. VON MÜLLER.

The Departmental Blazar.

SIR,

'G. R. L.' cannot read his *Forester*, if he is dependent on the *Pioneer* for all he knows of this subject. There are two courses open for the adoption of a blazer, *viz.*, the publicity of the *Forester*, and the endeavours of a private individual. I did my best in the latter way in Bombay, with the results reported, which are too discouraging and long drawn out to induce me to proceed further.

'White Flannel's letter again, seems to have been written before perusing mine of the previous month. I do not know what right he has to say that any considerable number of officers are opposed to *any* Blazer. My impression is that they are a very small minority. Nor do I know that their objection is worth any consideration, since they have only to abstain from wearing it, and the fact of my behaving differently cannot hurt them anywhere.

I again enter my protest against Coopers Hill colors. We are *not* Coopers Hill men and P. W. D—ites, and 'White Flannel' will have to wait a good bit yet before Coopers Hill will represent "the *élite*" of the Department. Nancy men and Germans will be going strong for many years yet, and they are all above Coopers Hill. I also again protest against any commonplace stripes of two raw greens, like the Burmah colors, and any rifle-green self colors, (unless with an adequate distinctive binding) for the reasons already given, *viz.*, that half the "Arrys" about town have green or green and white stripes; and rifle green, besides fading badly, is already appropriated by probably several rifle regiments, &c. We can surely combine neatness with distinctiveness. I cannot say that I see much hope of *any* blazer being adopted myself.

VELLEDA.

Note.—We are afraid we must agree with the last sentence. In reply to our enquiries, we have only received *seven* answers, they will be reported in due time. J. S. G.

A 'Bureau de Recherches.'

Last month we published a letter from our correspondent 'T' on this subject, but we had not sufficient space to thank him for his good wishes on behalf of the *Indian Forester*, and to point out, as we feel we ought to do, that we are not so deserving of compassion as he is good enough to think. So long as he gets plenty of good original papers, the work of the Honorary Editor is not very heavy and indeed comes to little more than the making up of a number and the passing of the proofs. In this latter work, brother officers in Dehra are kind enough to assist, and if the material is abundant and help is forthcoming for the reviews, the editorial work of the *Forester* is not very great. It is when contributions fall off and the editor has to go to work to supply the amount of manuscript necessary to make up about the usual

40 pages, that his worry begins, and therefore we hope that Forest Officers, who read this, will assist by sending us more original work. We badly want more 'sylviculture.' The late M. Puton told a former Honorary Editor that he was surprised that we had so little sylviculture in our pages; and we ourselves, in spite of the apparent endorsement of the charge by the former Editor, wrote to M. Puton and explained to him that the Department was still in the beginning of its work; still tied down largely to the selection, demarcation and settlement of forest estates; still trying to combat old prejudices in respect to shifting cultivation over-grazing, wasteful cuttings and fire; and that with all this it was creditable that as much sylvicultural information had been collected as was already on record.

We disagree with our correspondent in regard to making the *Indian Forester* a 'state concern': we much prefer it as it is at present, an independent departmental journal, free to discuss the Forest topics of the day, within the bounds of what is obviously due to the Government to which its Editor and chief contributors belong, and supported by Government to an extent which assures its permanency so far as finance is concerned. But we are delighted with the idea of making the *Indian Forester* what it tries to be and ought to be, the 'Bureau de Recherches' of the Department. If those who have observed anything that is not generally known, would send it at once and not wait or say to themselves, as our first Honorary Editor put it in his Preface of July 1875, "I did not think 'you would care about it; I thought it hardly worth sending" we should be able to record many very important and very useful facts and observations, and this we take it, is what 'T' wants us to do.

'T' says that it 'depends on personal whim whether or not 'contributions are published" and to this we must demur, for we are not aware of ever having rejected much at all and certainly only things which did not seem really suitable. We have, of course, to edit! that is the function of an editor: but our editing has never been of a very strong character and we are not aware that personal whim has ever had any influence on it. Financi ally, we are glad to say, the *Forester* does well enough, thanks to the recent influx of many new subscribers.

We may conclude this, by again making an appeal for more contributions; we can enlarge the journal if it is necessary to do so, but we feel that the real want is more original matter and that in that original matter, Forestry in its less wide scale, that is, Sylviculture, Utilization and Working Plans should find the chief place. And we would ask for more 'Shikar and Travel.' It would not do for our Journal to be 'all jam' but a little jam in each number is, we are sure our contributors and readers will agree with us in thinking, a pleasant addition to a bill of fare which must occasionally be rather insipid.

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III.—OFFICIAL PAPERS & INTELLIGENCE.

The Charduar Rubber Plantations in Assam.

We have received from the Government of India a copy of a report on the Charduar rubber plantation which had been called for by them in their review of the Assam Forest Administration Report for 1891-92. We quote the following extracts from it.

"The plantation which was commenced in 1873, had up to 'February 1884 report, been successfully carried out over 892 'acres at a cost of Rs. 64,351' or Rs. 72, per acre. The ques- 'tion then arose whether the undertaking should be continued or 'whether it would not be better to stop further extension.

'Mr. Mann considered he could prove the work to be financi- 'ally a paying one, and recommended a yearly extension of 200 'acres. He estimated that a rubber tree became mature for tap- 'ping purposes at the age of 50 years, that 5 seers of rubber could 'be obtained from such trees for 16 successive years, and that 10 'such trees would stand on an acre of planted land. That each 'tree, therefore, would yield 2 maunds, and each acre 20 maunds 'of rubber worth Rs. 54 per maund, or Rs. 1,080 per acre, as 'against an expenditure of Rs. 72 per acre for formation and 'up-keep. Even had this latter sum been increased by com- 'pound interest at 4 per cent. which would have brought the 'original outlay up to about Rs. 511 per acre at the end of 50 'years, there would still remain a large margin for profit accord- 'ing to the above estimate.

'The Chief Commissioner, Mr. (now Sir Charles) Elliott, did 'not take the same high view of the financial prospects of the 'plantation, and was of opinion that, except for the purpose of 'carrying out further experiments, no extension should be made. 'He considered the Forest Department had proved how the rubber 'tree could be most successfully propagated, and was of opinion 'that the further development of the industry should be left to 'private enterprise.

'The Government of India reviewed the whole question, 'and eventually decided that, as the financial prospect appeared 'favourable, as there was no immediate prospect of private capital 'being invested in the industry, and as there was every probability 'of the rubber supply being gradually exhausted, it would be wise 'to extend the plantation by 200 acres per annum. It was also

'ordered that certain tapping experiments should be carried out 'with the view of testing further the probable financial results, and 'that the planting of *Ficus elastica* as an epiphyte on other trees 'should be undertaken on a larger scale than heretofore.

'Work was, therefore, continued, although not on the scale of '200 acres a year, owing to financial pressure. An attempt to 'establish the plant as an epiphyte on about 50 acres was unsuccess-'ful, and in 1889, when the Inspector General of Forests visited 'the province, the plantation contained 1,043 acres of established 'trees, which had cost Rs. 85,582, or Rs. 82 per acre.

'In the report which followed the Inspector General's inspec-'tion of the Assam forests, it was again recommended that this 'annual extension of 200 acres should be proceeded with, which 'was accordingly done, with the result that at the close of the 'past financial year, 1892-93, the planted area has increased to '1,900 acres, and the expenditure to Rs. 1,23,700, or Rs.65 per 'acre.

'Work has been performed much cheaper of late years than 'formerly, which naturally is due to the experience gained by past 'failures, some of which were of an expensive nature. During the 'six years between 1887 and 1893, I find that keeping up the old 'plantation and putting out 860 acres of new extension (of which 'a large proportion has been planted a second time owing to 'failures) cost Rs. 41,871, divided over the two heads as follows:—

	Rs.	Rs.
'New work	37,289	41,871,
'Up-keep	4,582	

'I find also that, with six years' efficient protection, the plan-'tation is rendered tolerably safe against everything but illicit 'tapping, the trees planted out in 1886-87 (compartment 13) being 'now safely established

'We may estimate, therefore, from the above six years' expen-'diture, that future work may be carried out and permanently 'established for about Rs. 50 per acre, exclusive of controlling 'expenses, as follows:—

New work ...	Acres	Rs. 37,289 / 860	= Rs.	43·36 per acre.
Up-keep ...	Acres	4,682 / 860	= Rs.	5·32 „
			Rs.	48·68 „
			Say Rs.	50 „

'It is now to be decided whether it will be financially expe-dient to continue the operation at the above cost, but the data

'available for the proper discussion of this point are unfortunately 'still very meagre, although we have a little more information on 'one important factor of the calculation than Mr. Mann had when 'he wrote his report in 1884.

'The three chief points on which information is required 'are :—

'(1) Age of exploitable trees.

'(2) Number of productive trees obtainable to the acre.

'(3) Outturn of rubber per tree.

'With regard to the first point, I am inclined to accept Mr. 'Mann's tree of 50 years as a mature rubber-yielding tree. The 'oldest portion of the Chardnar plantation was put out in 1873-74, 'or 20 years ago, but the records prove that all the first compart- 'ments failed time after time, and were not really successfully 'planted until 1877-78, or even later. It is not likely, therefore, 'that the trees in the oldest portion are more than 15 or 16 years 'old. And yet they now average about 50 feet in height and 6 'feet in girth. Such trees may, I think, fairly be expected to 'become productive in 30 more years or less.

'The second point, regarding the number of trees likely to 'stand on an acre, is a doubtful one. Mr. Mann relied on obtain- 'ing 10 productive trees, and of course there would be no diffi- 'culty in obtaining this number in the plantation. But I feel a 'little doubtful that if 10 trees per acre are allowed to remain, they 'would ever attain the dimensions of the trees growing in the 'natural forests, or yield as much rubber as is obtained from 'those trees. For it has been found from measuring the lateral 'spread of 50 forest trees (see statement attached to this report) 'that such trees possess crowns 94 feet in diameter covering, on 'the average, 980 square yards of ground. Now our trees, until 'recently, have been planted out 100 feet × 25 feet and are so 'crowded in the lines that it seems necessary to remove half of 'them in order to give the remainder more room for development. 'But, if half of them were removed, there would remain only 'between 7 and 8 trees per acre, and these trees would have only 'about 550 square yards of ground each, as compared with above '980 square yards covered by the forest trees.

'This year a different system of planting has been introduced, 'the trees being put out 70 × 35 feet apart. Eventually, if half 'of these be thinned out, there will remain about 9 trees per acre, 'each covering 544 square yards of ground. Practically, however, 'we do not yet know what the future condition of the plantation 'will be, or by what method, if any, thinnings should be carried 'out in the present standing crop ; and it is difficult, therefore, to 'anticipate the number of trees of 50 years old that will be left 'standing on an acre. But, for the purposes of this calculation, I 'will assume that 8 such trees may be relied on.

'Then in regard to the third point, having reference to the 'outturn in rubber obtainable from a mature tree, Mr. Mann, in 'his above-quoted report, calculated that a tree would yield 'an annual outturn of 5 seers of rubber for 16 successive years, or 'a total outturn of two maunds. His calculation was based on 'certain tapping experiments that had been carried out on 50 'forest trees in 1882-83 and recorded as an Appendix to the report 'for that year. These experiments were carried out very care-'fully under the supervision of the divisional officer for six years. 'The trees were selected as not having been tapped before, or as 'having recovered from former tappings. They were not tapped 'lower than 4 feet above ground, the branches were not tapped at 'all, and the main axis was tapped at intervals varying between 2 'and 4 feet apart. The first year's tapping, on which Mr. Mann 'based his calculation, yielded an outturn of 5·60 seers of rubber 'per tree. But, as will be seen on reference to the statement 'attached to this report, this yield rapidly declined, and the 'annual tapping of the trees soon caused considerable damage.

'In the first year the yield was				5·60	seers per tree.
' „	second	„	„	1·06	„ (bad season).
' „	third	„	„	2.56	„ (good season).
' „	fourth	„	„	3·43	„ (includes yield of 2 new trees).
' „	fifth	„	„	1.06	„ (season good).
' „	sixth	„	„	·91	„ (season good).
		' Average		2·43	

'Instead, therefore, of yielding 5 seers per annum as was 'anticipated, these trees, which had been most carefully tapped, 'yielded 2.43 seers during the six years they were worked. More-'over, out of the 50 trees originally selected, 6 deaths had 'occurred.

'In 1884-85	...	...	1 tree died.
' „ 1885-86	...	...	1 „ „
' „ 1886-87	...	...	2 trees „
' „ 1887-88	...	...	2 „ „

'And it is fair to suppose that, if tapping had been continued, 'all of these trees would have died in the course of a few more 'years.

'So far, therefore, as the experiment goes, it certainly tends 'to prove that no large yield can be obtained from ordinary single 'trees, and that even moderate tappings, if carried out annually, 'soon destroy the tree. Mr. Mann's calculation of outturn must, 'I think, be looked on as much over-estimated. One has heard, 'it is true, of trees said to have yielded a maund of rubber in one 'season's tapping, but the information is not exact, and the results 'of the above experiment seem to forbid any such expectaion. We 'seem to be nearly as far as ever from finding out what the real 'outturn of a mature tree may be.

'It appears to me, however, that the chief mistake made was 'in thinking that the trees could be tapped year after year without 'the outturn becoming reduced in quantity. The mere fact of 'taking 5 seers of rubber from a mature tree would probably not 'injure this latter, provided a sufficient rest were given for recuper-'ation, and it might then be possible to extract a further similar 'quantity without permanent injury to the tree.

'This period of rest, I believe, should be not less than 5 years, 'which time is required, I am informed, for the tapping scars to 'heal over. It then, might be, I think, possible (judging from the 'experimental tapping results) to obtain another yield of 5 seers. 'But how long this process of yield and rest would continue, must 'at present be quite hypothetical. For the purpose of this report, 'however, it is necessary to assume certain figures. Therefore, let 'us suppose that a tree 50 years old is capable of yielding 5 seers 'of rubber once in every 5 years, between the age of 50 and 100 'years, or a total yield of 55 seers. Let us also suppose that 8 of 'such trees will stand on 1 acre of planted land, and that to establish '1 acre of such trees will cost Rs. 50. We may also, with much 'certainty, assume that a net profit of Rs. 50 per maund will be 'obtainable on the rubber outturn.

'The initial outlay of Rs. 50 will have accumulated to about 'Rs. 350 at the the end of 50 years, allowing compound interest 'at 4 per cent., and against this expenditure all that we could hope 'to realise would be Rs. 50 every fifth year, or the outturn 'of 8 trees = 40 seers of rubber, valued at Rs. 50 per maund. 'This amount of Rs. 50 would not equal the initial outlay for the 'five years' period of rest calculated at 4 per cent., which, on Rs. '300, would be Rs. 65. It is evident, therefore, that no matter how 'long the tapping process could be continued, there would result 'an ever increasing debt against the plantation. Judged on purely 'financial grounds, the further extension of this operation is not 'likely to be remunerative.

'The Government of India may, however, think that, in view 'of the nearly certain exhaustion of the natural rubber forests 'within the next 20 or 30 years, we should be justified in forming 'artificial forests for the purpose of keeping up a supply of a very 'valuable and useful product, provided the actual outlay incurred 'on its production were certain to be recouped. According to the 'above figures this recovery of actual outlay, irrespective of 'interest, would be realised from the first tapping at the end of '50 years, after which the plantation might be expected to pay at 'the rate of Rs. 50 per acre every fifth year for the next 50 years. 'But, if this view of the case were taken, and it was desired to 'supply the market with as much plantation rubber as is now 'obtained from the natural forests, say 4,000 maunds per annum, 'it would be necessary to tap over 4,000 acres a year, and to have 'established a productive area equal to 20,000 acres.

'The Government of India in their instructions requested that 'the report should deal with the plantation from a technical as well 'as from a financial point of view. In this report I have confined 'myself almost entirely to the latter standpoint as being 'the more urgent, and because I freely confess that the future 'treatment of the plantation is as yet a puzzle to me. We have 'discovered how best to propagate the rubber tree, and can, I 'think, rely on being able to extend its cultivation successfully to 'any reasonable extent at a cost of Rs. 50 per acre, but we are at 'present doubtful regarding the best treatment for obtaining a final 'crop on the ground.

'Last season, with the view of thinning out the trees in the 'lines, we tried to tap every alternate tree to death, and carried the 'operation over the two first compartments. The tapping certainly 'looked sufficiently severe, the main axis and all main branches 'of the trees being tapped at short intervals. But I am informed 'by Mr. Copeland, the divisional officer, that the trees operated 'on, so far as their general appearance is concerned, are now 'not distinguishable from their untouched neighbours, and in this 'connection it may be interesting to note that at the last inspection 'of the Conservator it was discovered that the roots of the trees 'standing in the same lines and even in adjoining lines 25 feet 'apart showed a decided tendency to anastomoze, so that, when 'exposed, the root system appeared as a continuous net work.

'If the roots of these plantation trees have really become in-'corporated in one system as suggested, it would perhaps explain 'why the tapped trees have suffered so little, because they have 'been sustained and nourished not only by their own channels of 'food supply, but also by those of their neighbours. On finding 'this out, the tapping operation was temporarily stopped; and, 'after consulting Mr. Gamble, of the Dehra Dun Imperial Forest 'School, it was decided for the present not to interfere with the 'apparently surplus trees, for it seems possible that a severe tapp-'ing operation, carried out on such trees, might have, to some 'extent, an exhausting effect on the adjoining trees which it is 'desired to protect and develop.

'The plantation will be carefully watched, and the technical 'report called for will be furnished when more information is 'available.

'It may be noted that the yield in rubber from tapping the '1,116 trees in compartments 1 and 2 came to only 3 maunds and '8 seers, or 9 tolas per tree.

'In conclusion, I beg to report that 150 acres of new ex-'tension having been prepared for planting at a cost of Rs. 1,800, 'I have authorised the Divisional Forest Officer to plant up this 'area at an additional cost of Rs. 2,000, and to suspend all further 'operations until orders are received from the Government of India'.

Statement showing results of tapping certain selected rubber trees in the Balipara plantation during the six years 1882-88.

Year.	Number of trees.	Total yield in rubber.	Average yield per tree.	Total net profit realised.	Total loss.	Net profit per tree.	Net loss per tree.	Remarks
		Seers.	Seers	Rs.	Rs.	Rs. a. p.	Rs. a. p.	
1882-83 ..	50	281	5·00	261	....	5 13 0	....	Season favourable.
1883-84 ..	50	53	1·06	....	15	....	0 4 9	Season very unfavourable owing to constant rain.
1884-85 ..	Old 48	123	2·56	138	....	2 9 0	...	1 tree died. Season favourable.
	New 6	76	12·66					
1885-86 ..	51	175	3·43	Not stated			....	1 more trees died Season favourable. Only 2 of the 6 new trees tapped.
1886-87 ..	48	51	1·06	Ditto			....	2 more trees died Season favourable. Only 2 of the 6 new trees tapped.
1887-88 ..	46	42	·91	Ditto			....	2 more trees died. Many trees reported to have yielded no rubber.

NOTE.—The lateral spread of these trees varied between 56 and 195 feet, the average diameter of crown being 94 feet.

These results seem to point to the necessity of a short rotation only for tapping. The experience of Bengal also seems to point to this, for we can remember, from having had personally to superintend much of the work, how the heavy tapping for 4 or 5 years in 1870 to 1875 in the Darjeeling Hills resulted in the death of the larger proportion of the trees and the weakening of the survivors to such an extent that when an attempt was made six years later to tap these again it was not successful. We stongly advise further experiments: one experimental area to be tapped for two years, then allowed two years rest and trees tapped again, and so on; another to be tapped every alternate year; another every year, but only slightly, and so on. The roots should on no account be tapped for they usually give only inferior rubber and their tapping is said to be the cause of the chief injury. What is often forgotten, we think, is, that the best yielding trees are not those grown on moist lands but those on comparatively dry slopes, and herein may possibly lie the reason for the apparent unsuccess of these fine plantations. But, given a suitable area, we confess to thinking that a little crowding may not do much harm: the object is presumably to get the maximum yield from the area and a somewhat crowded area would give more tapping surface. But we may be wrong, and it may be found that better rubber is got from branches and stems and droppers which have got full light around them, so that here, too, are questions which seem to demand further experiment.

The Question of the authority of altering Working Plans.

The following Circular was circulated a month or two ago among Conservators of Forests by the Inspector General. As it may possess considerable interest for those who have not seen it officially, we venture to reproduce it.

'Representations have recently been made by the Conservators 'of two Forest Circles to the effect that the provisions of the 'Forest Department Code and of many existing working-plans 'do not permit of sufficient latitude in the execution of prescribed 'works, more particularly works of improvement; and it has been 'suggested that the present practice and the rules contained in the 'Code should be modified. I had previously arrived independently 'at the same conclusion; but, before taking further action, will 'be obliged by your favouring me with your professional opinion 'on the general question raised.

'2. My own views may be briefly summarized as follows :—

'(i) Exploitation in deficit might be permitted on the order 'of the Conservator, who should however, subsequently report re- 'sults to his Local Government, and in cases where the deviation 'from the provision of the working-plan is considerable or con- 'tinuous, obtain the sanction of the Local Government thereto. 'Particulars of all such deviations should invariably be recorded in 'the control forms.

'(ii) The previous sanction of the Local Government should 'in every case be required, when it is proposed to exploit in excess '(provided such excess is not caused by the accumulation of balances 'due to deficit exploitation in previous years), or when it is con- 'templated to change in any way the character of the exploitation.

'(iii) The plan might *prescribe* that work—

(*a*) of sylvicultural improvement, or

'(*b*) connected with lines of communication and export '(the execution of which in any special year may depend so largely 'on circumstances we are unable to control or even to foresee) 'should be carried out during a certain period of years. Such 'works might be allotted in the plan to particular years, and 'such allotment should be binding on the local officers unless and 'until the Conservator had sanctioned the total or partial post- 'ponement of the work or other deviation, reasons for which he 'would invariably record in Form No. 3.

'(iv) As regards buildings, demarcation, and minor works 'of improvement, the general plan for a term of years might be '*prescribed*, deviations from which would require the sanction of 'the Local Government. But the manner in which the details of

'the plan would be carried out from year to year might be solely 'controlled by the Conservator, who would record in Form No. 3 'whether suggestions made in the plan, under this head, for each 'year's working, had been carried out or not, and, if not, why not.

'(v) Form No. 3 should not be made use of as an account 'form for the check of all expenditure upon works of improvement, 'but should be a record containing information sufficient to indicate 'how such works of material importance, prescribed or suggested 'in the plan, have progressed.

'3. I would ask you to acquaint me with your views as early 'as you conveniently can."

Inspection Notes on the Forests of South Coimbatore, North Malabar, Nilgiris and Madura.

These notes, received by the kindness of the Madras Government, are rather more instructive as samples of administration than as affording sylvicultural and other information of interest to our readers. The *South Coimbatore* note is especially remarkable for the curious circumstance that the Conservator's remarks are largely annotated by the Divisional Forest Officer who here and there is pleased graciously to agree with his Superior Officer and in other places to differ from him. After wading through these remarks, however, we were comforted at the end by finding that the Board of Revenue most properly objected to the arrangement, and expressed themselves as considering it "invidi- 'ous that the District Forest Officer should appear as a direct critic 'of the remarks of his Superior Officer, the Conservator." One would have thought that such an obvious proposition would have been as clear to the Collector and Divisional Officer as it was to the Board. The Conservator's note is full of the minutest details in some things: even such a trivial matter as the absence of 'hat pegs' in a Range Office has not escaped his vigilant eye, but while full of such details, there is an absence of forestry information. There are, however, some interesting matters regarding Forest Engineering, and especially on the—

"*Timber Slip.*—When I was last here in 1888, I considered 'with Mr. Porter the feasibility of a slip in place of the drag-road 'down which logs were moved by elephants in the old days.

'I considered the site then selected to be too steep and 'further inquiries were started with view to lowering the logs by 'wire or other means, but nothing satisfactory was arrived at.

'Mr. Bryant has, however, opened up a part of the old drag- 'road, paved it with timber laid lengthways instead of crossways,

'and converted it into a slip, which I was so satisfied with, that I 'have authorized him to spend up to Rs. 500 in continuing the 'experiment.

'It is proposed to slide the logs from the top slip depôt (end 'of the tram line) to a bottom slip depôt, which touches the ghât 'road sufficiently far down to avoid all the most difficult parts of 'the ghât, and thereby save As. 7-6 a candy (12½ cubic feet) on 'the present rates for carriage, which are As. 15-6 per candy by 'road from the top slip depôt to the foot of the ghât.

'The slip will be about 900 yards long, and as the upper 'portion already tried measures 150 yards and cost about Rs. 150, 'we may calculate that with more substantial work it will cost 'about Rs. 1-8-0 a yard, or say within Rs. 1,500 to do the whole 'line.

'I think the work is feasible and my only doubt is as regards 'the last 100 yards or so which will be very steep, but which may, 'if necessary, be improved by a raised platform on trestles or a 'bund or by diverting the course so as to take in a hill side on the 'south. The saving in carriage on a take-out of 50,000 cubic 'feet a year would be nearly Rs. 2,000.

'The upper portion of the slip laid by Mr. Bryant roughly 'averaged 15 degrees (1 in 3½) gradient for 100 yards (the start for '20 yards was 23 degrees or 1 in 2½), and then 9 degrees 1 (in 6) 'gradient for 50 yards; and one ton logs took 20 seconds to do 'the 150 yards, so that logs would take about 2 minutes to do the 'whole slip when completed—a rate of about 15 miles an hour.

'The pace of a log will depend on the state of the slip. In 'wet weather logs would travel too fast. The slip will have to be 'sanded or greased according to weather and gradients."

We are glad to learn that the working of the Anamalai tramway has been a success, although "the rails are too light for the 'work and the trucks unnecessarily heavy."

The *North Malabar* Inspection note is annotated by the Collector and is more interesting from a true forest point of view than that of S. Coimbatore, though there is nothing much requiring special quotation.

The *Nilgiri* note we have naturally read with some interest and a great deal of disappointment We are glad to see that the Conservator appreciates the point that 'fires' on grass lands 'destroy 'the finer class of grasses' and that in large grazing grounds like these of the Kundahs, the outer edges usually get much over grazed while the further portions are hardly touched. We entirely agree with the Conservator that the idea that 'shola' would not reproduce itself from coppice is a mistaken one. There are fine pieces of coppice regrowth in the middle of Coonoor Peak Forest and at Naduvatam, and the idea which underlies the Collector's remarks about such work having been 'tried and resulted disastrously,' is, in our opinion, simply due to impatience. Those who do not understand Forests and their treatment professionally, are sometimes apt

to think that, because the show of reproduction made in the first few years is not very apparent, therefore the reproduction is a failure ; and in the Nilgiris this tendency is intensified by the ever present object lesson of the Eucalyptus. People who see the Blue gum reach six feet in height in a year are disappointed because shola-coppice scarcely reaches much more than as many inches. The whole of the Nilgiri sholas, in our opinion, very badly require treatment; and if careful treatment, under professional officers, is not given them, they will by slow degrees deteriorate and as one by one the big trees fall, their place will be occupied by bushes and scrub and *not young trees*. But we fear that until such matters are left to professionals, the sholas of the Nilgiris, like the New Forest and parts of Fontainebleau will have to continue to be treated by '*exploitabilité physique*.' Our disappointment, to which we referred at the outset, was due to the absence of any notes on the results of the blue gum and wattle working plans. There are very few Forest Districts in India which are so interesting, if properly managed, as those of the Nilgiris, but there are 'too many cooks' and if the Government does not soon insist on a simple Working Plan for the whole District, including all the Working Circles, teak, blue gum, shola, etc, and then order it to be carried out without interference, change for cavil for at least 20 years, prohibiting the Collector and Forest Officer from listening to amateur advice, there is likely to be worse deterioration than these reports shew and the forests will be converted from samples of what ought to be done, into samples of 'how not to d it.'

We have been led to some extent to these remarks by noticing that the Board are going to ask Mr. Popert to visit the Teak Forests and give his advice based on his long experience of teak in Burma, and we venture to suggest that his visit might be extended to the sholas and the plantations of blue gum. The other remarks of the Board are good and suitable, and their suggestion regarding the possible import of Mudumalai woods, other than teak, for use in the hills, is one which is fully worthy of consideration.

The *Madura* Inspection note we cannot understand. The Conservator's report says he was in the District for 23 days, but the Divisional Officer was apparently unaware of it. Here too, as in S. Coimbatore, we have explanations by the Divisional Forest Officer on the Conservator's remarks and these explanations are long: however, if the latter's inspection was not made in the presence of the former, this is hardly to be wondered at. We reproduce the remarks of :—

(1). Conservator.
(2). District Forest Officer.
(3). Collector .

en the region which bears the romantic name of the 'High Wavy Mountains' as likely to interest our readers. We should

like to hear more about these hills and wish Mr. Gass would send us an account of them after his next visit.

"1. *Conservator.*—I had arranged to go across the so-called 'High Wavy Mountains with Mr. Gass, but the weather was un-'propitious and the trip had to be abandoned.

'I have, however, approved of the District Forest Officer's 'proposal to make early application to built a rest-house up there 'and to secure a decent bridle-path approach to it.

'I would suggest a site for the rest-house as near the Suruli 'water-fall as possible. It would be higher and more central than 'the site suggested further north.

'With a path up, and a building erected, there would be 'greater chance of these fine hills being developed.

'At present little is known about them, beyond that they 'range between 5,000 and 6,500 feet; that the sholas there are 'extensive and dense; and that the only forest produce at present 'brought down consists of cardamom and the beesha reed.

'It is fortunate that we have been able to make them reserved 'forests, for they appear to catch the clouds of both north-east 'and south-west monsoons, and, judging from the size of the 'Suruli water-fall looked at from below during the rains, they 'must tap the clouds to a considerable extent.

'I do not know what the exent of the drainage on the top 'of the hills is, but it apparently all falls into the Suruli river on 'the Cumbum valley side of the hills."

'2. *District Forest Officer.* I have submitted detailed pro-'posals for the construction of a rest-house on the High Wavy 'Mountain and for improving the present path, in the Budget 'Estimate and annual Plan of Operations for 1893-94.

'I do not much care where the rest-house is located. The 'place I suggested has a path already leading to it. The site near 'the water-fall is more visited by elephants. It is no doubt more 'central, but is at a slightly lower elevation than that suggested by 'me. The water here flows from north to south to the water-fall 'and not *vice versâ*.

'A rest-house on these hills and a decent path up to them 'will certainly facilitate inspection and render it a more comfor-'table affair than it is at present. This range of hills is, however, 'better known than the Conservator appears to think. I have been 'up them frequently; always once, and sometimes twice, in the 'year, and I have been through them in various directions. The 'whole upper part is covered with evergreen forest, and not 'merely a series of large and dense sholas. This forest covers the 'top and runs down in long irregular shaped masses for a consider-'able distance on either side. The whole drainage from the top is 'into the Cumbum valley, as may be seen on the map. The 'Suruli river has two long branches, which, rising at some distance 'north and south of the water-fall, meet close to it, after flowing 'in almost straight lines towards it.

'The importance of these hills from a climatic point of view 'is very great indeed. This reserve was selected by the Forest 'Committee in 1880. The area of the top or plateau, if it may be 'so called, is probably about 15 square miles. Below the evergreen 'forest there is a zone of bare rocky grass land, and the lower 'slopes are well covered with valuable forest and are constantly 'visited and inspected."

3.—'*Collector.*' I went to the top of the "High Wavy" with 'Mr. Gass and am decidedly of opinion that the forest on the plateau 'should be better inspected. A pathway up and a good rest-house 'should be made.

'The ascent is very steep, it is almost impossible to get tents 'up. There is too much indiscriminate cattle-grazing and shooting 'in all the forests of the Cumbum valley."

IV.—REVIEWS.

A Tamil Manual of Forestry.

"*A Manual of Forestry. Vols. I and II. by Dr. W. Schlich C. I. E., translated by C. M. Maduranayakam Pillai, Sub-Assistant Conservator of Forests, Central Circle, Madras. K. R. Press, Madras, 1893.*"

The translator has sent us a copy of this. It is a handy little Volume and is of a useful size. We are not told, however, what the price is. The translator says in his Preface, that he has had considerable difficulty in finding suitable Tamil words and phrases to give equivalents of the technical terms employed. We easily understand the difficulty and hope that those Tamil Foresters who use the work, will find the terms adopted suitable and easily to be comprehended. The translation is published with Dr. Schlich's permission and when giving that permission he advised Mr. Maduranayakam Pillai to be as clear as possible and make his descriptions as simple as possible. The print seems good though rather small and the illustrations are fairly done. We are sure the work will be useful to subordinate Forest Officers in South Madras and wish it every success.

V.—SHIKAR AND TRAVEL.

Chakla Drogmula.

(*Continued from page 315 and completed.*)

Three is one drawback in the case of the Kandi Forests and that is the distance from the Pohru River which is a measured three miles, so that heavy logs over six feet in girth cannot be conveyed to the river at present Srinagar prices, *viz.*, six annas per cubic foot in the log, we must therefore resort to the sawing of scantling. Hitherto the custom has been to fell only second and third class trees, because these could easily be transported overland, but this spells ruin to the forest. It might be supposed that the number of first class trees must be enormous, but this is not the case, since many have been cut to provide boat planks (*takhtas*) and many have been killed by that pest, the village mochi, who used to remove a strip of bark from all round the base of the tree, thus causing it to die. It is exasperating in the extreme to see the way land has been cleared in the very centre of the forests, first the bushes are cut, then the trees barked, so as to kill them, and finally the bushes are heaped up round the foot of the trees and fired. If any trees are felled they are left lying on the ground till dry and then burnt and this in a country where every portion of the tree is valuable and can be exported to the city at a profit. But again, are these ignorant, simple people, as blamable as our own early settlers in Australia, or as the Americans and Canadians at the present time? Do *they* look ahead to the time when timber will be scarce? Not if all accounts be true. Our aim will now be to induce the public to use blue pine instead of deodar by reducing the price; there is no good reason against the use of the blue pine in Srinagar, especially with the example of Murree to go by, which it is believed, is almost entirely built of that species. The Forest Department in Kashmir is much hampered in the delivery of timber by the fact that the Pohru River only contains sufficient water for floating logs of any size during two or three months in the year, when the snow is melting, after that it is a wretched puddle, only fit to carry small poles or scantlings. Here bullocks are used for dragging timber from the forest to the river; a loop is cut in the end of each log through which a rope is passed and some 8 or 10 bullocks are then yoked to the log. The people have an ingenious plan of turning a stream of water on to the dragging path which reduces the friction. Early in the season, when there is abundance of water in the various

small streams coming from the hills, a dam is made at a certain place below the forest, and inside this, a deep pool of water collects; to this there is a sluice gate opening into a nala which joins the river, the logs are dragged as far as the sluice, put in below, and the sluice is opened and the logs swept down to the river. This, however, is of no avail later on, and the logs have to be dragged the whole three miles by land.

A relic of the past is the system of advancing money to bring out timber, the villager considering the wood his own property till his account has been settled! I found some unmarked logs lying near the forest and on asking a question, was told they were not state property for the above reason. The result of this system of advances is, that there are now hundreds of logs scattered about in the village lands outside the forest, which have been lying there for more than four years and notwithstanding any number of orders of an urgent nature, no one has stirred to deliver them at the water's edge. The villager was paid in full, five years ago, so having nothing to get, he does not care a bit for orders and there the logs lie rotting; if the Department spends more money on them, it might whistle for it, for any chance it has of getting it back from the villagers, so that the only way will be to get some gentle pressure put on them through the Civil authorities; altogether, it is a most unsatisfactory state of affairs. In connection with this, it is curious how the present system of taking land revenue in kind, acts and re-acts throughout the land. Thus, the villagers would rather be paid in rice than in money and one of the first requests contractors make is for *shali* (paddy) and of course they want it at the rate of Rs. 1-4 per *kharwar* or 86¾ seers, because it is sold to the city people at this rate. It is almost impossible to buy any rice out in the district, it would appear that those who have it are afraid to sell it at a fair rate and do not see why they should accept the State rate, so that it is most difficult to get even the small quantity required by one's servants. This Department is enabled to get a small stock by an old rule which permits it to levy contribution on each boat load of state *shali* as it passes down the river and this forms our stock, from which to supply contractors for their workmen. It will be a great thing for the country, when all land revenue is taken in cash and villagers can sell their grain at the market rate, which is higher than the State rate. Formerly cotton and other products were accepted, but some of these had to be abandoned, as it was found that the rate fixed for, say, cotton, was much higher than it was worth, consequently the sharp villager poured in as much cotton as he could procure and the State was left with a store of stuff saleable only at a loss. It seems absurd to go on selling rice at the present rate, when it is worth much more and when everything has risen in price, and servants now get higher wages than in the Punjab to mention only one item, but, of course, the system must be gradually changed or there would be the usual outcry. Another way in which this Department is affected by the State *shali* supply, is that in order to keep

up a sufficient stock in the City last winter, the authorities had to impress all the boats they could lay hands on, consequently very few were to be had for the conveyance of firewood and timber; this is very unfortunate, as the natural result is a scarcity of both in the city and, of course, the poor F. D. is represented as being the cause of it all, because it would not allow indiscriminate fellings as before, whereas this has nothing whatever to do with it!

J. C. Mc. D.

VI.—EXTRACTS, NOTES AND QUERIES.

Treatment of Waste lands in the Low Countries.

The great sandy formation which covers the largest half of the Netherlands, passes out of Holland into Hanover, and stretches entirely across Northern Germany into Russia, the medium level of the whole district being only about fifty feet above the sea, and nowhere rising above three hundred. It is geologically very ancient, and its surface is marked by foreign rocks, which lie scattered over its surface, supposed to have been transported thither by icebergs from Norway and Sweden, in some previous geological epoch. This formation makes the principal part of Northern Europe one great sandy plain, with very little landscape beauty, except that which arises from great green stretches overhung with a vast and ever-changing sky, which have served as an inspiration to a race of landscape artists, who have rendered, with Dutch fidelity, the features of their country. "Les accidents du pays," says L'Esquirol, "sont dans le ciel," but these apparently meagre details have been enough for Hobbema and Rüysdael and Cüyp to work with in producing their immortal canvases. Alternating with this sandy district, in Holland, as well as in Belgium, are extensive heath and peat lands, which afford another example of the way in which persistent industry can overcome obstacles in husbandry. These peat beds have been worked for five hundred years, so that the deposits in many cases have been entirely exhausted; but undismayed, the persistent Dutch farmers drain the holes by pumping, and put them under cultivation, the basis being clay which is

capable of being converted into a good soil. It is not uncommon to find at the bottom of these excavated basins, the remains of old forests : but what would other people think of making farms in such cellars as these and by such tedious processes? They begin by trenching the beds in which the peat is only fit for use after eight years, the deposit being often more than thirty feet in thickness, and only capable of removal by very slow degrees. This peat cutting, however, is a great branch of industry in Holland, for it is the only fuel the country produces, there being no coal, and but a very limited supply of forest. The growth of peat is here still in progress, and the same curious phenomena are still to be observed that were noticed by Pliny in the time of the Roman occupation. For example, fields are still found floating upon the water, and rising and falling with it. The Dutch maintain that the whole town of Dort, a large and flourishing place, shifted its location during one of the inundations. During another, a field on which ten or twelve cows were feeding, was drifted across the Dollart, a broad sheet of water many miles in width, which forms the boundary between Holland and Hanover, and fastened itself on the opposite shore in a foreign country, without the loss of an inhabitant.

The theory which prevails in regard to these peat beds, is that they have been formed by the growth and gradual destruction of aquatic plants, growing in shallow pools and lakes, forming a vegetation which originally floated on the surface of the water and finally attached itself by its roots to the bottom, extinguishing the sheet of water by transformation. But it is in the heath lands of Holland that the greatest results have been achieved by industrious and ingenious exploitation. As late as 1842, they were considered nearly valueless, so that in that year the state sold about 60,000 acres at sixteen or seventeen cents an acre. These lands, subjugated by a regular, though varied, system of cultivation, have been so successfully handled, that twelve years after the original sale 20,000 out of the 60,000 acres were resold for nearly two dollars an acre, and since then some of them have brought as high a price as ten or fifteen dollars an acre.

The methods adopted with these waste lands are various. One is sheep feeding on such parts of the ground as admit it ; another is to shave off the sod, pile it in heaps in the sun to dry, burn it, and dress patches with the ashes or spread them on the contiguous sandy lands.

But the favourite method of reclaiming both heath and sands, is the planting of forests of Firs and Pines, which is done with the extraordinary patience that characterizes this indomitable race. Though the profit is slow in coming in, it is found to pay in the long run. The seedlings, a year old, are planted at the rate of 13,000 to 14,000 to the acre. They are first pruned in the seventh year ; afterwards every two years, the trimming

paying the expense. At the end of twenty years they are cut for hop-poles, at twenty-five years for supports for galleries in coal and other mines. In fifty years they furnish timber for small buildings, and then the land is finally cleared off and regular cultivation is begun, the soil being by that time fit for working. Poor lands, treated in this way, are estimated to yield an annual product of four or five dollars a year per acre during the process.

The ancient method of treating the heath, which was introduced into Holland some two centuries ago, was copied from the Tartars, who have practised it from time immemorial on the plains of Asia. This consists in burning the sod over vast tracts at once. At times, this is done to such an extent that the air is filled with smoke for hundreds of miles, as in the burning of our great forests. After this, the ground is merely harrowed and sown with buckwheat or other grain, of which the product is twelve or fifteen bushels to the acre. The land thus treated can be cultivated for about seven years, yielding for the first three years a good harvest. Then the crop begins to fall off and in three or four years more it dwindles to little or nothing, and the land is abandoned. After resting for twenty years it is found to be in a suitable condition to burn again. In Asia the Tartars wander backwards and forwards over the immense steppes of lower Siberia and northern China, moving to another tract when one becomes exhausted. These wandering races have been known to remote ages, and isolated bands of them drift into Europe and form a valuable proportion of the labouring population of Russia. But in the rest of Europe, and more especially in diminutive Holland, these larger features of heath cultivation are now wanting.

These pictures of struggling husbandry on sterile soils are by no means without their use. They afford an instructive lesson to the patient cultivator of stubborn and unproductive lands, who may learn from them that, however great his drawbacks, there are other people with greater ones. They teach, also, that there is no piece of soil so bad that it cannot by skill and industry be made to produce some kind of a crop which will repay its possessor for exercising his intelligence in its management.—(*Garden and Forest.*)

News for Foresters

A correspondent writes "one lives and learns! Let me 'commend to the notice of the *Indian Forester* a para. in the 'Indian Agriculturist' for August 12th, 1893, p. 438 on 'the evils 'of transplanting." The following is the para. referred to :—

"A tree intended for timber should never be removed from 'the spot on which the seed germinated. No matter how carefully 'the removal is effected, the point of the tap roots is broken, 'and when that is the case the tree will never attain as great a 'height as it would have done if left to grow after nature's own 'fashion.

'It is from the system of transplanting that oaks grown in 'Britain acquire that round-headed habit which is their general 'characteristic. There may be some cases in which the direct 'descent of the tap-root of self-sown trees has been checked and 'diverted from the perpendicular by meeting with an impervious 'subsoil or rock. The effect in those cases would be nearly 'identical with that of transplanting, but as the tap-root may 'not have lost its point, the effect would sometimes be less plainly 'marked. The German high forestry system is based on the plan 'of imitating nature—*i. e.*, of sowing the seeds where the trees 'are to stand. All the treatment given thereafter consists of 'thinning out the trees at intervals, and on these occasions 'allowing a little extra room to those that are intended to be 'the permanent members of the forest."

Comment on our own part would be superfluous, so we leave this gem for our reader's amusement.

Tour of the Inspector General in Assam.

The Inspector General of Forests intends visiting Assam in November next with the view of personally inspecting the Chardnar rubber plantation, and deciding on the future policy of the Forest Department in regard to extending or putting a stop to the experiment. The plantation now covers an area of 2,063 acres and contains 28,546 established trees and plants, put out at intervals of 25 feet in lines, the latter being 100 feet apart with belts of evergreen forest between them.

VII.—TIMBER AND PRODUCE TRADE.

Statement of average selling rates of timber and bamboos in Meerut, Bulandshahr, Pilibhit, Bareilly, and Moradabad for the quarter ending 30th June, 1893.

Description.	Timber Scantlings per score.		Bamboos per 100 score.		Remarks.
	From	To	From	To	
MEERUT.	R. A. P.	R. A. P.	R. A. P.		
Sal 10′ Tors (Poles) ...	8 0 0	18 0 0	...	...	
Sal & Sain, &c., Karris, 12′ × 5″ × 4″ ...	25 0 0	40 0 0	...	...	
Sal bed posts, 7′ × 2½″ × 2½″ ...	10 0 0	12 0 0	...	...	
Bamboos of 9′ to 10′ per 100 score ...	...	...	40 0 0	100 0 0	
BULANDSHAHR.					
Sal 10′ Tors (Poles) ...	...	...	...	...	
Sal, and Sain, &c., Karris, 12′ × 5″ × 4″ ...	...	...	...	...	
Sal bed posts, 7′ × 2½″ × 2½ ...	...	...	...	..	
Bamboos of 9′ to 10′ per 100 score ...	...	...	72 0 0	72 0 0	
PILIBHIT.					
Sal 10′ Tors (Poles) ...	40 0 0	70 0 0	...	...	
Sal and Sain, &c. Karris 12′ × 5″ × 4″ ...	30 0 0	40 0 0	...	...	
Sal bed posts 7′ × 2½″ × 2½′ ...	5 0 0	6 4 0	...	...	
Bamboos of 9′ to 10′ per 100 score ...	...	...	60 0 0	100 0 0	
BAREILLY.					
Sal 10′ Tors (Poles) ...	5 0 0	10 0 0	...	..	
Sal & Sain, &c , Karris, 12′ × 5″ × 4″	25 0 0	35 0 0	...	...	
	40 0 0	50 0 0	..	...	
	50 0 0	60 0 0	...	...	
Sal bed posts 7′ × 2½ ″ × 2½″ ...	10 0 0	25 0 0	...		
Bamboos of 9′ to 10′ per 100 score ...	...	...	50 0 0	137 0 0	
MORADABAD.					
Sal 10′ Tors (Poles) ...	20 0 0	25 0 0	...	...	
Sal, & Sain, &c., Karris, 12′ × 5″ × 4″ ...	30 0 0	50 0 0	...	...	
Sal bed posts 7′ × 2½″ × 2½″ ...	10 0 0	12 8 0	...	...	
Bamboos of 9′ to 10′ per 100 score ...	...	...	50 0 0	100 0 0	

Churchill and Sim's Circular.

AUGUST 4th, 1893.

EAST INDIAN TEAK.—The deliveries continue good, showing 7,626 loads so far this year, against 6,421 loads and 8,978 loads for the same periods of 1892 and 1891 respectively. In July this year, 1,062 loads were delivered against 756 loads last year, and 918 loads the year before. The stock has decreased, but is still overloaded with inferior wood, which depresses quotations. The supplies are not excessive, and a little demand would soon raise prices; moreover, there seems some ground for hope that the ship building trade has passed its most stagnant point. The threatened blockade of Bangkok, which is now averted, would, if persisted in, have cut off the Siamese supply, but it was never sufficiently believed in, to give rise to any speculation.

ROSEWOOD.—The demand remains very quiet, and sales are not readily effected.

SATINWOOD.—The parcels lately arrived are sufficient for present demand, which is chiefly for figury logs, there being no demand for *planks* and *boards*.

EBONY—Has been more enquired for, but can only be placed t low prices.

PRICE CURRENT.

Indian Teak	per load	£9-10s.	to	£15
Satinwood	,, ton	£5	to	£12
Rosewood	,, ,,	£5	to	£9
Ebony	,, ,,	£5	to	£7

MARKET RATES OF PRODUCTS.

(*Tropical Agriculturist, August 1st, 1893.*)

Cardamoms, Malabar	per lb.	2s.	to	2s.6d.
Croton seeds	per cwt.	20s.	to	27s.6d.
Cutch	,,	20s.	to	23s.
Gum Arabic, Madras	,,	15s.	to	50s.
Gum Kino	,,	£15	to	£20.
India Rubber, Assam	per lb.	1s.7d.	to	2s.3d.
,, Rangoon	,,	1s.7d.	to	1s.11d.
Myrabolams, Bombay	per cwt	10s.	to	11s.3d.
,, Godavari	,,	7s.6d.	to	8s.
Nux Vomica	,,	8s.	to	11s.
Orchella	,,	22s.	to	28s.
Redwood	per ton	£3.	to	£3-10s
Sandalwood, logs	,,	£35	to	£55
,, chips	,,	£9	to	£30
Sapan wood	,,	£4.	to	£7.
Seedlac	per cwt	40s.	to	70s.
Tamarinds	,,	8s.	to	9s.

VIII.—EXTRACTS FROM OFFICIAL GAZETTES.

1.—Gazette of India.

25th July, 1893.—No. 809-*F.*—*Erratum.*—In the Notification of this Department, No. 796-F., dated the 21st July 1893, *for* "substantive appointment of Deputy Conservator, 1st Grade," against Mr. E. G. Chester's name, *read* "substantive appointment of Deputy Conservator, 2nd Grade."

25th August, 1893.—No. 914-*F.*—Mr. J. A. McKee, Officiating Conservator of Forests, Assam, having rejoined his appointment on the 8th instant, forenoon, on return from the privilege leave granted him in the Notification of this department, No. 492-F., dated the 12th May last, Mr. R. H. M. Ellis, Officiating Conservator, reverted on the same date to his appointment of Deputy Conservator, 1st grade (provisional), Assam.

2.—Madras Gazette.

21st July, 1893.—V. Kalyanarama Iyer, Forest Ranger, Fifth Grade, is transferred from Anantapur to Kurnool.

26th July, 1893.—A. Eggia Sastri, Forest Ranger, Fourth Grade, Godavari District, is granted 20 days' privilege leave with effect from 1st September 1893.

4th August, 1893.—No. 399.—M. R. Ry. V. Alwar Chetti Garu, Extra Assistant Conservator of Forests, Second Grade, to act as District Forest Officer, North Arcot, during the absence of Mr. J. G. F. Marshall on privilege leave, or until further orders.

9th August, 1893.—Fifteen days' privilege leave granted to Mr. Stafford in this office order No. 32 of 1893-94 is cancelled.

11th August 1893.—Ranger G. R Middleton, upon expiration of leave, from North Arcot to Chingleput.

Ranger T. Narayanaswami Aiyar, upon being relieved by Ranger Middleton, from Chingleput to North Arcot.

19th August, 1893.—The Board of Revenue has granted nineteen days' privilege leave, under article 291 of the Civil Service Regulations, to Mr. P. M. Lushington, Deputy Conservator of Forests, Godavari District from 23rd June 1893.

3.—Bombay Gazette.

1st August, 1893.—No. 5548.—Mr. W. F. D. Fisher, Assistant Conservator of Forests, Second Grade, and Divisional Forest Officer, Panch Mahâls, is allowed examination leave for two months from 6th August 1893.

1st August, 1893.—Mr. A. C. Robinson, Extra Assistant Conservator, proceeded on three months' privilege leave on the forenoon of 10th July 1893, handing over charge of the Sub-Divisional Office,

Kolába, to Mr. A. Stewart, Divisional Forest Officer, Kolába, who handed over charge of the same office to Mr. Ganpat Jeywant Rege, acting Extra Assistant Conservator of Forests, on the forenoon of the 22nd idem.

5th August, 1893.—Mr. T. B. Fry, Deputy Conservator of Forests, Second Grade, and Divisional Forest Officer, Working Plans, N. C., and Mr. G. P. Millett, Deputy Conservator of Forests, Fourth Grade, and Divisional Forest Officer, West Thána, delivered over and received charge of the Working Plans Office on the 4th August 1893, in the afternoon.

7th August, 1893 No. 5697.—His Excellency the Governor in Council is pleased to appoint Mr. E. G. Oliver to be Fourth Grade Deputy Conservator of Forests *vice* Mr. R. P. Ryan, dismissed, with effect from the date of the vacancy.

9th August, 1893.No. 5761.—The following draft rule under clause *(i)* of Section 25 of the Indian Forest Act 1878, is published for general information. Persons who have any objection to urge to the draft rule are required to forward their objections in writing to the Acting Chief Secretary to Government, Revenue Department, within three months from the date of publication of this Notification :—

"The poisoning, for any purpose whatever, of water within a Reserved Forest and the explosion therein of dynamite for the purpose of killing or catching fish are prohibited."

22nd August, 1893. No. 6079.—Mr. J. Baptista, L. C. E., Divisional Forest Officer, Sukkur, passed an examination in Sindhi according to the Higher Standard on the 3rd ultimo.

23rd August, 1893.No. 6095.—Mr. H. W. Keys, Deputy Conservator of Forests, Fourth Grade, has been allowed by Her Majesty's Secretary of State for India to return to duty within the period of his leave.

4.—BENGAL GAZETTE.

28th July 1893. No. 2682.—Consequent on the return from three months' privilege leave of Mr. E. P. Dansey, Conservator of Forests, Bengal, the following reversions are hereby ordered in the Upper Controlling Staff of the Bengal Forest Department, with effect from the forenoon of the 14th July 1893 :—

Mr. E. G. Chester, Officiating Conservator of Forests, Bengal, to revert to his substantive appointment of Deputy Conservator of Forests, 2nd grade.

Mr. G. A. Richardson, Officiating Deputy Conservator of Forests, 2nd grade, to revert to the 3rd grade of Deputy Conservators.

Mr. C. G. Rogers, Officiating Deputy Conservator of Forests, 3rd grade (seconded), to revert to the 4th grade of Deputy Conservators.

Mr H. D. D. French, Officiating Deputy Conservator of Forests. 3rd grade, to revert to the 4th grade of Deputy Conservators (provisional).

28th July 1893. No. 2683.—With reference to this Department's Notification, No. 2682 For., dated the 28th instant, the following arrangement of Forest Officers is hereby ordered :—

Mr. E. G. Chester, Deputy Conservator of Forests, is appointed to the charge of the Darjeeling and Kurseong Forest Divisions, *vice* Mr. C. A. G. Lillingston, Deputy Conservator of Forests, appointed Personal Assistant to the Conservator of Forests, Bengal.

28*th July* 1893. No. 2705.—Mr. C. C. Hatt, Assistant Conservator of Forests, second grade, is promoted to the first grade of Assisant-tant Conservators provisionally, with effect from the 9th May 1893.

1*st August* 1893. No. 2724.—Mr. J. C. Mendes, Extra-Assistant Conservator of Forests, attached to the Sundarbans Forest Division, is transferred to the Singhbhum Forest Division.

15*th August* 1893. No. 2891.—Mr. E. E. Slane, Extra-Assistant Conservator of Forests, attached to the Darjeeling Forest Division, is temporarily placed in charge of the Kurseong Forest Division.

15*th August* 1893. No. 2892.—Mr. E. E. Slane, Extra-Assistant Conservator of Forests, 4th grade, is promoted to the 3rd grade of Extra-Assistant Conservators, with effect from the 15th June 1893.

5.—N.-W. Provinces and Oudh Gazette.

11*th August* 1893. No. 2329.—Mr. W. Shakespear, Deputy Conservator of Forests, in charge of the Ganges Forest Division, Central Circle, privilege leave for two months, with effect from the 2nd September 1893.

11*th August* 1893 No, 2430.—Mr. J. M. Blanchfield, Extra Assistant Conservator of Forests, on return from leave, to hold charge of the Ganges Forest Division in the Central Circle, during the absence on leave of Mr. W. Shakespear, or until further orders.

15*th August* 1893 No, 2360.—The under-mentioned officer has been granted by Her Majesty's Secretary of State for India permission to return to duty :—

Name.	Service.	Appointment.	Date on which permitted to return.
Mr. E. A. Down ...	Covenanted.	Deputy Conservator of Forests.	Within period of leave.

6.—Punjab Gazette.

5*th August*, 1893.—No. 422.—Mr. F. O. Lemarchand, Deputy Conservator of Forests, Punjab, is granted three months' privilege leave, under Articles 277 and 291 of the Civil Service Regulations, with effect from the 27th July 1893, or such subsequent date as he may avail himself of it.

9*th August*, 1893.—No. 426.—Bhai Sadhu Singh, Extra Assistant Conservator of Forests, Punjab, is granted privilege leave of absence for two months under Article 291 of the Civil Service Regulations, with effect from the 15th July 1893, or such subsequent date as he may avail himself of it.

18*th August*, 1893.—No. 441.—Mr. Somers-Smith, Assistant Conservator of Forests, passed the examination in Hindustáni by the Lower Standard on the 2rd May 1292.

19*th August*, 1893.—No. 445.—Under the provisions of Section 87 of the Hazára Forest Regulations, 1893, the Hon'ble the Lieutenant-Governor is pleased to empower the officer in charge of the Hazára Division, for the time being, to compound Forest offences under the said section.

7.—CENTRAL PROVINCES GAZETTE.

2*nd August*, No 3558.—Mr. F. S. Barker, Deputy Conservator of Forests, has been granted, by Her Majesty's Secretary of State for India, six months' leave on medical certificate in further extension of the medical leave granted to him by Notification No. 970, hated the 20th February 1893.

5*th August*, No. 3643.—Privilege leave for three months, under Article 281 of the Civil Service Regulations, is granted to Mr. A. W. Blunt, Officiating Deputy Conservator of Forests, 4th grade, Bilaspur with effect from such date as he may be permitted to avail himself of it.

8*th August*, No. 3668.—Three months' privilege leave, under Article 291 of the Civil Service Regulations, is granted to Mr. G. F. Taylor, Deputy Conservator of Forests, with effect from the date on which he may be permitted to avail himself of it.

8*th August*, 1893.—No. 3699.—Mr. R. C. Thompson, Extra-Assistant Conservator of Forests, transferred to the Mandla Forest Division, under Notification No. 3332, dated the 20th July 1893, is tempiorarily posted to the charge of the Nimar Forest Division.

10*th August* No. 3727—Mr. H. Moore, Deputy Conservator, of Forests, Central Provinces, has been granted by Her Majesty's Secretary of State for India, ten days' furlough in extension of the furlough for one year granted him by Notification No, 2402.

10*th August*, 1893.—No 3845.—(1) In accordance with the provisions of Section 45 of the Indian, Forest Act (NII of 1878 as amended by Act V of 1890) the Officiating Chief Commissioner is pleased to direct that the following shall be the areas within which all unmarked wood and timber shall be deemed to be the property of Government unless and until any person establishes his right and title thereto :—

(a) All reserved forests and unclassed State forests in the Central Provinces.

(b) The following rivers and tributaries of rivers within the Central Provinces, namely, the Nerbudda, Tapti, Wardha, Kannan, Pench, Wainganga, Pranhita, Sheonath, Mahanadi, Godavari and Indrawati and their tributaries; also the several tributaries of the rivers Jamna and Son rising through the districts of Saugor, Damoh and Jubbulpore, together with an area within a direct distance of one mile from either bank of the main stream of the said rivers and tributaries of rivers, taking that stream at its cold-weather season level.

(2) The Officiating Chief Commissioner is also pleased to exempt from the provisions of Section 45 of the said Act all wood and timber found adrift, beached, stranded or sunk, excepting sal, shishum, teak, bija, and saj, of and exceeding two feet in girth and six feet in length.

No. 3846.—The following rules made by the Officiating Chief Commissioner, Central Provinces, under Section 51 of the Indian Forest Act, 1278, are published for general information :—

(1) any person may salve any timber found adrift, beached, stranded or sunk, other than timber exempted from the provisions of Section 45, by *Central Provinces Gazette* Notification No. 3845 dated the 17th instant.

(2) The amount to be paid by the Government in the case of Government timber or by a private owner in the case of private timber to the salver as salvage fees shall be 50 per cent, of the local value of the timber salved as adjudged by the Divisional Forest Officer.

22*nd August*, 1893.—No. 3943—Mr. Mahomed Kadir Buksh, Extra Assistant Conservator of Forests, in charge of the Burhanpur Sub-Division, is temporarily posted to the charge of the Nimar Forest Division.

Notification No. 3669, dated the 8th instant, is hereby cancelled.

No. 3944.—Privilege leave for three months, under Article 291 of the Civil Service Regulations, is granted to Mr. M. Muttannah, Extra Assistant Conservator of Forests, with effect from the 1st proximo.

No. 3945. Mr. W. King, Deputy Conservator of Forests, at present in charge of the Narsinghpur Forest Division, is transferred to the Mandla Forest Division.

No. 3946—Mr. Ali Muttaki Khan, Senior Forest Ranger, in charge of the Shahpura Range, Mandla Forest Division, is posted temporarily to the charge of the Narsinghpur Forest Division, to work under the immediate orders of the Deputy Commissioner.

23*rd August* 1893 No. 3981.—Mr. L. K. Martin is appointed an Extra-Assistant Conservator of Forests, 4th grade, with effect from the 24th July 1892.

Notification No. 3937, dated the 18th October 1892, is hereby cancelled.

No. 3982.—The position of the officers of the Lower Controlling Staff of the Forest Service in the Central Provinces, Berar and Coorg stood as follows on the 25th August 1892:—

Name.	Appointment.	Remarks.
Mr. Chandar Kumar Chatterji	Extra-Assistant Conservator, 1st grade.	
Khan Sahib Mahomed Ghouse	Do,	
Mr. Mansukh Rai ...	Do.	
,, Shridhar Ganesh Paranjpe	Extra-Assistant Conservator, 2nd grade.	
,, Norman Chester MacLeod	Do.	
,, J. J. Hobday ...	Do.	

Name.	Appointment.	Remarks.
,, C. H. Haldane ...	Extra-Assistant Conservator, 3rd grade.	
,, Ahmed Ali	Do.	
,, Ramchandra Krishna ...	Do.	
,, Mahomed Kadir Baksh	Do.	
,, Rasul Khan ...	Extra-Assistant Conservator, 4th grade.	
,, Bukhan	Do.	
,, R. C. Thompson ...	Do.	Supernumerary.
,, Shrinivasulu Naidu ...	Do.	
,, L. K. Martin ...	Do.	
,, F. Seager	Do.	

Notification No. 3939, dated the 18th October 1892, is hereby ancelled.

8.—BURMA GAZETTE.

22*nd July* 1893.—No. 265.—The following temporary promotions are made in the Forest Department, with effect from the 1st July 1893, the date of Mr. Calthrop's transfer to Berar:—

Mr. W. W. T. McHarg, Assistant Conservator, 1st grade, to officiate as Deputy Conservator, 4th grade.

Mr. G. R. Long, Assistant Conservator, 2nd grade, to officiate as Assistant Conservator, 1st grade.

No. 266.—With reference to section 79 of the Upper Burma Forest Regulations, 1887, as amended by Regulation VIII of 1890, the Chief Commissioner makes the following rule as to the circumstances under which persons may be required to bind themselves by instruments to fulfil certain obligations. This rule shall be read as rule 72 of the rules under the said Regulation

72. Any person applying for a license or permit to fell or remove timber or to collect or remove forest produce, may be required (before such license or permit is issued to him) to enter into a bond binding himself to observe the conditions of such license or permit, and covenanting that he and his servants and agents will abstain from the acts prohibited by the Upper Burma Forest Regulations, 1887, the rules made thereunder, and any acts specifically prohibited by the license or permit or bond.

24*th July*, 1893.—No. 267.—Mr. C. W. B. Anderson, Extra Assistant Conservator of Forests, is transferred from the charge of the Paungbyin Revenue station, Upper Chindwin Division, to the Yaw Forest Division.

18*th July*, 1893.—No. 7.—Mr. G. R. Long, Assistant Conservator of Forests, made over, and Mr. T. A. Hauxwell, Deputy Conservator of Forests, received charge of, the Agency Division on the afternoon of the 17th July 1893.

21*st July*, 1893.—No. 14.—With reference to Revenue Department Notification No. 200 (Forests), dated 8th June 1893, the Deputy Conservator of Forests, Minbu division, and the officiating Deputy Conservator of Forests, Yaw division, respectively made over and received charge of the Zigat Revenue station on 14th July, before noon.

28*th July*, 1893.—No. 271.—Under the provisions of Article 291 of the Civil Service Regulations, privilege leave for 20 days is granted to Mr. W. F. L. Tottenham, officiating Deputy Conservator of Forests, with effect from the 31st July 1893, or the subsequent date on which he may avail himself of it.

29*th July* 1893.—No. 272.—In exercise of the powers conferred by section 19 of the Upper Burma Forest Regulation, 1887, The Chief Commissioner revises the arrangement in respect of taungya cultivation made by Revenue Department Notification No. 300, dated the 7th December 1891, by cancelling the permission granted thereby to certain inhabitants of Ledagyi village to practise taungya cultivation within the Palwe reserve.

1*st August*, 1893.—No. 279.—Under the provisions of Articles 277 and 891 or the Civil Service Regulations, privilege leave for three months and fifteen days is granted to Mr. C. L. Toussaint, officiating Deputy Conservator of Forests, with effect from the 1st August 1893, or the subsequent date on which he may avail himself of it.

No. 280.—Mr. H. H. Forteath, Assistant Conservator of Forests, is transferred from Mandalay to the charge of the Yaw Forest division during the absence on privilege leave of Mr. C. L. Toussaint, or until further orders.

1*st August*, 18 3. No. 272.—In exercise of the powers conferred by sections 33 and 34 of the Upper Burma Forest Regulation, 1887 the Chief Commissioner makes the following alterations in the forms of licenses prescribed in Revenue Department Notification No. 140 (Forests), dated tSe 19th April 1893:—

(i) For conditions (1) and (2) to Appendix IX substitute the following:—

"(1) That the licensee or any one employed by him shall not fell or cut any catechu tree of less than 3 feet in circumference at 1 foot from the ground level, and shall not remove, chip, boil, or otherwise utilize the wood of any such tree that may have been felled by any other person, except with the written permission of a Forest Officer of not lower rank than an Extra Assistant Conservator of Forests."

"(2) That, if stumps of catechu trees of less than 3 feet in circumference are found in the vicinity of the catechu-boiling camp in which the holder of this license is working, and if there is reasonable proof from the dragging tracks on the ground that the trees cut from such stumps have been hewn into logs and taken to the said camp, this license shall be liable to confiscation by order of the Forest Officer

in charge of the division, or of any Forest Officer of not less rank than an Extra Assistant Conservator within whose jurisdiction the camp is situated."

(ii) in condition (4) of Appendix IX omit words "*for each cauldron*" wherever they occur.

(iii) In condition (2) of Appendix IX omit the words "*for each cauldron.*"

(iv) In Appendix XII omit the words "*or collect resin*" in the heading and in the first line of the form.

(v) In clause *(i)* of Appendix XII for "*exclusion*" read "*exclusive right.*"

Substitute the following for the heading of Form :—

"*License to collect myrabolams, indwe, pwenyet, honey and wax, lac, thanatka bark, or shaw fibre.*

2nd August 1893. No. 285.—Under the provisions of Articles 277 and 282 (*a*) (1) of the Civi Service Regulations, privilege leave for three months and 15 days is granted to Mr. T. H. Aplin, Deputy Conservator of Forests, with effect from the 5th August 1893, or the subsequent date on which he may avail himself of it.

No. 286.—Mr. H. N. Thompson, Assistant Conservator of Forests, is transferred from the Mingin subdivision, Lower Chindwin division, to the charge of the Upper Chindwin Forest division.

No. 287.—Mr. C. W. A. Bruce, Assistant Conservator of Forests, is transferred from the Upper Chindwin to the charge of the Lower Chindwin Forest division.

2nd August 1893. No. 15.—Under section 43 (2) of the Upper Burma Forest Regulation, 1887, Myingyan, on the Irrawaddy river, is hereby declared to be a station for the reception of drift timber within the jurisdiction of the Officer in charge of the Yaw Forest division.

7th August 1893. No. 16.—With reference to Revenue Department Notification Nos. 279 and 280, (Forests), dated the 1st August 1893, Mr. C. L. Toussaint, Deputy Conservator of Forests, availed himself of the three months and 15 days' privilege leave granted to him and made over charge of the Yaw Forest division to Mr. H. H. Forteath, Assistant Conservator of Forests, on the forenoon of the 1st instant.

8th August 1893. No. 17.—Mr. T. H. Aplin, Deputy Conservator of Forests, Lower Chindwin division, availed himself, on the forenoon of the 5th August 1893, of the three months and 15 days' privilege leave granted him in Revenue Department Notification No. 285 (Forests), dated the 2nd August 1893.

No. 18.—With reference to Revenue Department Notification No. 287 (Forests), dated the 2nd August 1893, Mr. T. H. Aplin, Deputy Conservator of Forests, made over, and Mr. C. W. A. Bruce, Assistant Conservator of Forests, assumed charge of, the Lower Chindwin division on the forenoon of the 5 instant.

No. 19.—With reference to Revenue Department Notification No. 286 (Forests), dated the 2nd August 1893, Mr. C. W. A. Bruce, Assistant Conservator of Forests, made over, and Mr. H. N. Thompson, Assistant Conservator of Forests, assumed charge of, the Paungbyin subdivision, Upper Chindwin Forest division, on the afternoon of the 27th July 1893, and of the Upper Chindwin Forest division on the afternoon of the 26th July 1893.

15*th August* 1893. No. 10.—With reference to Revenue Department Notification No. 291F., dated the 28th July 1893, Mr. W. F. L. Tottenham, officiating Deputy Conservator of Forests, availed himself of the privilege leave granted him therein in the forenoon of the 31st July 1893.

16*th August* 1893. No. 11.—Mr. W. F. L. Tottenham, officiating Deputy Conservator of Forests, reported his return to duty on the forenoon of the 15th August 1893, from the privilege leave granted him in Revenue Department Notification No. 291, dated the 28th July 1893.

10*th August* 1893. No. 20.—With reference to Revenue Department Notifications Nos 286 and 287 (Forests), dated the 2nd August 1893, Mr. H. N. Thompson, Assistant Conservator of Forests, made over, and Mr. C. W. A. Bruce, Assistant Conservator of Forests, assumed charge of, the Mingin subdivision, Lower Chindwin division, on the forenoon of the 27th July 1893, in addition to his other duties.

12*th August* 1893. No 21.—With reference to Revenue Department Notification No. 267 (Forests), dated the 24th July 1893, Mr. C. W. B. Anderson, Extra Assistant Conservator of Forests, attched to the Yaw Forest division for general duty, reported his arrival at Pakôkku on the afternoon of the 22nd July 1893.

9.—ASSAM GAZETTE.

11*th August* 1893. No. 8039G.—In consequence of the return from privilege leave of Mr. J. A. McKee, officiating Conservator of Forests, Assam, the following reversions are notified with effect from the 8th August 1893,—

Mr. R. H. M. Ellis, Officiating Conservator of Forests, Third Grade, to be Deputy Conservator of Forests, First Grade (provisional).

Mr. J. L. Pigot, Officiating Deputy Conservator of Forests, First Grade (provisional), to be Deputy Conservator of Forests, Second Grade (provisional), and to be seconded.

Mr. D. P. Copeland, Officiating Deputy Conservator of Forests, First Grade (provisional), to be Deputy Conservator of Forests, Second Grade (provisional).

Mr. H. G. Young, Officiating Deputy Conservator of Forests, Second Grade (provisional), to be Deputy Conservator of Forests, Third Grade (provisional).

Mr. T. J. Campbell, Officiating Deputy Conservator of Forests, Third Grade (provisional), to be Deputy Conservator of Forests, Fourth Grade.

14*th August* 1893. No. 8068G.—Babu Jogesvar Sur, Extra Assistant Conservator of Forests, Third Grade, is reduced to the Fourth Grade of Extra Assistant Conservator with effect from the 17th July 1893, and is attached as subdivisional officer in charge of the Nowgong Forest Division under the orders of the Deputy Conservator of Forests, Darrang.

18*th August* 1893. No. 8226G.—Privilege leave of absence for five weeks, under articles 277 and 291 of the Civil Service Regulations, is granted to Mr. R. H. M. Ellis, Deputy Conservator of Forests, with effect from the 8th August 1893.

10.—Hyderabad Residency Gazette.

2nd August 1893. No. 230 Mr. L. K. Martin is appointed as Extra, Assistant Conservator of Forests, 4th grade, with effect from the 24th July 1893.

So much of *Residency Orders* Notification No. 256, dated the 24th August 1893, as relates to the pay of Mr. Martin, as well as *Residency Orders* Notifications No. 291, dated the 22nd September 1893, and No. 120, dated the 1st May 1893, are hereby cancelled.

2nd August 1893. The position of the officers of the lower controlling staff of the forest service in the Central Provinces, Berar and Coorg, stood as follows on the 25th August 1892 :—

For details see Central Provinces Gazette Notification No. 3982 of 23rd August 1893.

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APPENDIX SERIES

OF

THE INDIAN FORESTER.

Note on the Sea-borne Export Trade in Timber from Tenasserim.

TENASSERIM was ceded to the British in 1826, but, as noted in the British Burma Gazetteer, Burma had long before that year been a great timber-exporting country. The bulk of the timber in former days used to be exported from the port of Moulmein, and "Moulmein Teak" was well known and appreciated for its good qualities, so that for many years all Teak exported from Burma went under that name.

The Customs Office in Moulmein was first organized in the year 1855, so that previous to that year no figures of the actual export of timber are obtainable.

The accompanying tables contain all the available figures of the export trade in timber from the year 1855-56 to the year 1891-92. It will be convenient to divide the export trade under two heads:—

(1) The sea-borne export trade in Teak.

(2) The sea-borne export trade in all other kinds of timber.

Of the Teak timber exported from Moulmein previous to the year 1855, it is more than probable that a large proportion was obtained from the forests in British territory, and especially from the valleys of the Ataran, the Salween, and its tributaries, the Yemzalin and Domdami. But as the forests here, more particularly those in the Ataran, were ruthlessly worked and denuded under leases issued to private individuals, the supply soon began to fall off, and timber traders had to go further inland to the Thaungyin valley, to Karrenni, and the Shan States. The actual imports of foreign timber, so far as can be ascertained, commenced on or about the year 1848; but the import figures in the Kado Depôt records extend back only as far as the year 1859-60, in which year the import of foreign Teak is shown to be considerable, and it has been maintained since.

From the table (Annexure A) it will be seen that the export of Teak to the United Kingdom, and, in fact, to all foreign ports, varies more or less from year to year. There has never been a steady increase or a steady decrease.

Leaving out the last two years, the export to the United Kingdom was highest in the year 1864-1865, when 53,039 tons were exported, and lowest in 1886-87, when it fell to 8,531 tons.

In the years 1890-91 and 1891-92 the decrease in the amount exported was remarkable, coming to only 6,451 tons in 1890-91 and 6,831 tons in 1891-92, as against 23,555 tons in 1889-90.

To Indian ports the export of Teak rose from 8,191 tons in 1855-56 to 30,229 in 1857-58.

From that year, like the exports to the United Kingdom, the amount exported has varied from year to year, the highest export being 95,997 tons in 1887-88.

During the last three years the trade has been fairly steady.

The export trade to Egypt, Port Said, and Cape Colony up to the year 1878-79 was very desultory. Since the latter year an amount, which, however, varies considerably, has been steadily exported.

Records exist of only two small exports to Australian and American ports.

The exports to provincial ports have never reached any very high figure. The largest amount, 6,080 tons, was exported in the year 1887-88.

Annexure D shows the prices obtained for articles manufactured from Teak, of which there has been an export since the year 1866-67.

The present state and future prospects of the Teak trade of Moulmein are not hopeful.

Of late years, and especially during the last two or three, there has been not only a considerable falling off in the exports, but a great lack in such exports of timber of good length and girth.

The reasons for the decrease in, and of the inferiority of, exports are, briefly, the competition of Bangkok and Rangoon, which has acted most unfavourably on the exports from Moulmein, the forests in British territory being fearfully overworked, and the timber now drawn from them being most inferior in quality, while it is to be feared that the imports of foreign Teak will begin to fail at no distant date.

Already within the last eight years the imports of full-sized Teak logs has fallen off from 1,41,774 in 1884-85 to 54,375 in 1891-92.

Timber importers also complain that the extraction of Teak in foreign territory becomes more expensive year by year by reason of the forests in the vicinity of floating streams being utterly exhausted and timber of any value being now found only at great distances from such streams, entailing often a two-years' drag.

The figures of the export of the sea-borne trade of woods other than Teak have been traced back to as far as 1866-67. What kinds of wood were exported between the years 1866 and 1872 is not known, no record beyond the mere figures of the export existing.

In 1872-73 Padauk (*Pterocarpus indicus*) and Pyinma (*Lagerstræmia Flos-reginæ*) were exported.

In 1873-74, the exports were 1,330 tons of Thitka (*Pentace burmanica*) and Thitkado (*Cedrela Toona*), 88 tons of Pyinma, 50 tons of Padauk, and 50 tons of Thingan (*Hopea odorata*).

In 1874-75 616 tons of Thitka and Thitkado and 576 tons of Padauk, Ingyin (*Shorea siamensis*), Pyinkado (*Xylia dolabriformis*), and other woods made up the exports.

Of the exports from 1875 to 1882, Padauk timber formed a notable portion. In those years the exports of this timber were as follows:—

	Tons.
1875-76	[illegible]
1876-77	142
1877-78	183
1878-79	77
1879-80	169
1880-81	153
1881-82	258

The balance of the exports was made up by woods of other kinds, but there are no records to show what these woods were.

In 1882-83 the exports consisted of 156 tons of Pyinma, 81 tons of Padauk, and 25 tons of Ingyin, the balance consisting of Pyinkado and woods for tea boxes.

In 1883-84 the exports were 249 tons of Padauk, and the balance of Pyinkado and woods for tea boxes.

In 1884-85, 141 tons of Padauk were exported, while Thitka and other woods for tea boxes amounted to 3,613 tons.

In 1885-86 the exports were 15 tons of Ingyin and about 400 tons of Padauk. There was also some selected Thitka shipped to the Home market as an experimental consignment. The demands for woods for tea boxes fell off owing to the low prices at which second-class teak was obtainable.

In 1886-87 about 200 tons of Padauk were exported, and the demand for woods for tea boxes improved towards the end of the year, the Moulmein tea boxes being considered superior to the Assam ones.

In 1887-88, 139 tons of Padauk were exported, and Kanyin having been accepted in lieu of Thitka, Pyinma, and Thitya (*Shorea obtusa*), for the manufacture of tea boxes, the demand for these continue to increase.

In 1888-89, 190 tons of Padauk were exported, with about 32 tons of Ingyin.

In 1889-90 the exports of Padauk were 160 tons.

In 1890-91, 87 tons of Padauk were shipped, while the remainder of the exports for the last two years were mostly Kanyin (*Dipterocarpus*) and Pyinma. The demand for Moulmein tea boxes, owing to those shipped from Japan being preferred on account of their cheapness, showed a decided falling off.

From Mergui the exports from the year 1866-67 to 1876-77 were mostly Thingan timber. The shipments made after these years consisted chiefly of Pyinkado and some Gangaw (*Mesua ferrea*) sleepers.

The exports from Tavoy were nearly all Pyinkado sleepers and scantlings, and a small quantity of Thitka. During the last few years the trade in these has shown a marked increase.

The exports of boat-hulls have been traced from 1885-86 onwards.

The export trades in woods other than Teak to the United Kingdom, to Egypt, and to European ports has never been of any extent; in fact, the export being rarely other than experimental consignments.

To Indian ports it increased steadily up to the year 1883-84, after which there was a marked decline. During the last three years, however, the demand seems to be increasing.

To provincial ports there has been a small export since the year 1877-78, the exports for the year 1891-92 in these woods showing a marked increase on previous years.

The present prospect of the trade in woods other than Teak is encouraging. Owing to many new lines of railway being started in India, the demand for sleepers has increased considerably. The bulk of these has hitherto consisted of Pyinkado, but owing to the keen competition among traders and the difficulty experienced in the conversion of Pyinkado (one of the hardest woods in the forests), a vast number of sleepers of other woods during the last two years have been shipped to

the Indian market. Among the woods tried have been two, Kanyin and Ingyin, which are certainly unsuitable to the purpose, and efforts have been made to introduce Pyinma, a far superior wood for sleepers.

Under the orders of the Chief Commissioner of Burma, the State Railways in Burma have taken over a consignment of sleepers of this wood for trial, and quite lately shipments of the same have been made by various timber-dealers to India. Pyinma, it may be noted, is superior to Pyinkado in that it is more easily worked and has more lasting powers, especially in damp situations. As a material for house-building, Pyinma is as good almost as Teak, and efforts are being made to introduce the wood for that purpose also.

It is to be noted that the supply of all these woods, with the exception of Ingyin and of Pyinma, so far as the Tenasserim Forest Circle is concerned, is limited, and should the demands for them increase much, under the existing system of extraction under licenses, the forests will be more or less depleted of these woods.

MOULMEIN.

C. T. BINGHAM, *Major*,
Conservator of Forests,
Tenasserim Circle.

A

Sea-borne trade in Teak Timber from Moulmein.

Year.	United Kingdom.		Continental Ports.		Indian Ports.		Egypt, Port Said, and Cape Colony.		Australian and American Ports.		Provincial Ports.		Remarks.
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	
		R		R		R		R		R		R	
1855-56	18,535	9,26,745	10	590	8,191	4,09,600	377	18,854	...	...	1,664½	83,227	Under "Indian Ports" are included all Asiatic Ports except Provincial Ports.
1856-57	30,981	15,14,092	...	...	10,279	5,03,122	..	..	...	...	1,066	53,367	
1857-58	36,772	16,95,078	...	...	30,229	11,50,878	654	28,432	...	...	1,716	74,863	
1858-59	38,639	17,19,012	...	...	40,062	19,92,213	...	.	...	...	898	33,622	
1859-60	34,097	17,59,600	896	59,650	24,497	13,32,365	...	...	...	...	758	37,903	
1860-61	23,542	13,49,255	252	23,400	28,586	15,53,499	...	...	...	...	1,350½	38,815	
1861-62	54,670	34,92,417	4	200	40,799	24,99,577	...	..	...	...	1,553	70,703	
1862-63	33,187	20,21,028	893	66,975	40,772	21,78,634	...	...	...	...	715½	35,385	
1863-64	23,984	13,50,714	307	20,528	42,188	22,81,352	...	...	...	...	1,190	75,847	
1864-65	53,039	34,34,819	764	49,710	56,910	31,45,461	..	.	...	...	3,649	2,07,952	
1865-66	39,430	26,17,393	320	22,402	75,139	43,26,954	150	12,000	...	...	2,112	1,23,320	
1866-67	12,191	8,17,824	909	52,620	32,987	19,78,017	...		...	...	2,150	1,34,970	
1867-68	12,634	8,11,409	977	68,397	45,649	21,33,635	...	...	...	...	849	62,892	
1868-69	34,075	21,67,778	935	58,775	60,020	32,25,773	...		...	...	681	35,925	
1869-70	9,116	5,88,156	1,854	1,36,799	57,716	28,70,772	...	..	...	...	1,036	63,436	
1870-71	18,814	13,22,215	2,225	1,61,563	32,490	17,64,785	..	...	...	...	349	16,557	
1871-72	24,357	17,70,423	35	2,470	30,589	17,81,970	...	...	...	...	1,077	56,879	
1872-73	31,497	23,37,576	979	77,405	45,006	25,06,451	.	...	...	...	955	46,476	
1873-74	31,629	24,62,723	1,059	75,346	51,631	31,40,590	334	43,489	...	...	1,719	83,465	
1874-75	21,637	16,26,873	613	46,006	51,673	32,89,829	..	..	...	...	2,818	1,59,017	
1875-76	29,112	21,81,187	199	15,948	75,469	49,06,965	389	27,259	...	...	5,730	3,35,088	
1876-77	26,102	19,12,679	...		48,897	30,86,027	...	...	...	...	3,524	1,93,644	
1877-78	32,606	23,39,975	371	28,000	80,176	54,91,131	...	...	...	...	4,897	2,62,095	
1878-79	16,287	11,71,979	1,238	86,940	85,682	48,73,536	...	...	...	...	2,900	1,54,945	
1879-80	23,297	16,90,075	1,989	1,50,124	71,900	41,02,493	1,229	91,642	...	...	4,992	2,50,564	
1880-81	42,233	31,44,894	...	..	70,396	41,46,537	770	38,519	...	...	3,200	1,88,487	
1881-82	41,762	38,48,929	1,687	1,42,601	67,267	44,30,614	590	53,100	...	...	3,879	2,44,843	
1882-83	37,209	38,90,480	2,009	2,32,599	68,898	56,63,981	1,126	1,20,913	785	91,068	1,621	1,38,283	
1883-84	16,215	19,58,713	2,284	3,08,142	68,063	62,57,762	3,777	4,65,424	...	...	1,040	93,476	
1884-85	21,810	25,89,798	860	1,08,793	70 239	55,28,615	2,940	3,52,911	...	...	2,049	63,857	
1885-86	16,364	18,12,850	5	600	44,692	32,98,187	2,307	2,60,693	...	...	1,190	1,01,429	
1886-87	8,532	7,05,891	6	750	36,078	25,24,020	2,021	1,65,260	97	10,670	1,644	1,05,810	
1887-88	13,206	13,16,317	2,581	2,63,061	96,997	59,16,257	4,743	4,60,177	...	...	6,080	5,23,127	
1888-89	22,783	25,41,102	4,927	6,26,953	62,207	41,81,666	3,548	3,72,098	...	...	1,580	1,41,848	
1889-90	23,555	27,36,448	1,907	2,71,754	53,393	37,56,037	2,016	2,41,619	...	...	3,029	2,78,771	
1890-91	6,451	6,90,366	1,426	1,36,467	53,839	36,31,058	2,511	2,41,645	...	...	567	38,205	
1891-92	6,831	7,01,372	1,704	1,84,687	51,099	30,74,226	1,457	1,39,338	...	...	1,239	88,744	

B

Sea-borne trade in woods other than Teak from Moulmein.

Year.	United Kingdom.		European Ports.		Indian Ports.		Egypt-Port Said.		Provincial Ports.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
		R		R		R		R		R
1866-67	...	...	...	...	303	20,150	...	...	...	
1867-68	...	...	...	...	413	47,467	...	...	...	...
1869-70	...	...	...	...	24	770	...	...	...	...
1870-71	...	...	...	...	783	18,390	...	...	...	...
1872-73	...	...	...	...	500	23,800	...	...	...	...
1873-74	...	...	1,105	40,424	203	9,210	...	...	...	...
1874-75	...	...	14	619	1,010	53,675	...	...	...	...
1875-76	...	...	...	...	145	9,761	...	...	...	...
1876-77	...	..	...	...	...	...	...	...	...	
1877-78	...	...	25	...	241	...	...	...	62	...
1878-79	31	1,115	15	...	144	4,650	...	...	127	4,390
1879-80	53	1,865	1	15	800	46,781	128	5,635	223	7,358
1880-81	5	220	...	...	1,243	37,333	...	...	515	25,619
1881-82	3	140	...	...	1,477	94,610	...	...	1,720	68,959
1882-83	11	600	...	...	3,103	1,86,224	...	...	1,805	65,353
1883-84	6	280	...	...	4,284	2,47,075	...	...	2,017	68,241
1884-85	22	1,170	14	283	2,557	1,50,053	...	...	1,161	38,631
1885-86	...	...	...	...	2,777	1,76,283	...	...	434	14,674
1886-87	...	...	...	...	1,391	85,962	6	130	190	8,021
1887-88	...	...	...	...	827	48,416	...	...	400	14,868
1888-89	...	...	1	48	1,932	86,133	...	...	718	20,948
1889-90	56	2,717	...	...	4,809	2,09,780	...	...	1,391	66,039
1890-91	...	...	112	4,661	3,028	1,11,886	25	735	1,459	50,813
1891-92	42	1,677	...	...	4,420	1,92,177	137	6,568	2,060	78,680

C

Sleepers and Railway Keys from Moulmein.

Year.	Sleepers.		Railway Keys.			
	Indian Ports.		Indian and other Ports.		United Kingdom.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
		R		R		R
1882-83	658	1,178	10,976	31,938	...	...
1883-84	...	...	7,090	18,847	...	...
1884-85	...	...	4,625	10,505	...	...
1885-86	...	...	10,528	26,142	...	...
1886-87	19,800	49,266	9,261	23,211	...	...
1887-88	1,044	5,730	8,554	15,845	1,127	1,691
1888-89	...	...	9,880	21,143	...	...
1889-90	6,791	17,330	7,078	15,758	...	...
1890-91	8,189	14,980	1,048	1,842	...	...
1891-92	31,790	84,557	2,142	7,172	...	...

D

Teak manufactures from Moulmein.

Year.	United Kingdom.	Continental Ports.	Egypt, etc.	Indian Ports.
1866-67	...	...	...	2,134
1868-69	...	...	...	4,444
1869-70	...	...	...	5,615
1870-71	...	...	...	1,090
1871-72	...	...	...	2,612
1872-73	...	...	...	6,873
1873-74	...	...	...	792
1874-75	...	...	...	306
1879-80	...	...	...	...
1880-81	...	...	...	...
1881-82	...	...	...	109,877
1882-83	...	...	...	121,437
1883-84	1,303	270	...	92,084
1884-85	903	180	1,169	117,107
1885-86	...	...	1,871	71,668
1886-87	747	2,066	3,522	85,283
1887-88	...	982	4,318	233,711
1888-89	...	1,844	2,607	172,959
1889-90	640	196	992	165,069
1890-91	20	3,518	1,523	163,348
1891-92	...	1,308	5,771	158,161

E

Tavoy and Mergui.

Year.	Tavoy.				Mergui.	
	Timber.		Boat-hulls.		Timber.	
	Quantity.	Value.	No.	Value.	Quantity.	Value.
1866-67	...	...	...	...	9	261
1867-68	...	...	...	...	9	191
1868-69	...	...	...	...	16	444
1869-70	...	...	...	...	25	789
1870-71	...	...	...	...	...	...
1871-72	...	...	...	...	2	80
1872-73	...	...	...	...	168	2,336
1873-74	...	...	...	...	31	919
1874-75	...	...	...	...	58	1,427
1875-76	...	...	...		139	1,159
1876-77	71	4,000	...	...	7	400
1877-78	252	7,778	...	...	...	...
1878-79	352	20,000	...	...	53	2,900
1879-80	348	19,520	...	...	...	...
1880-81	381	21,209	...	...	...	...
1881-82	767	36,524	...	...	...	...
1882-83	726	26,540	...	...	...	...
1883-84	805	31,810	...	...	8	204
1884-85	97	29,070	...	...	...	...
1885-86	769	36,083	24	25,500	...	...
1886-87	1,144	46,223	39	34,125	41	100
1887-88	917	34,684	47	43,250	...	...
1888-89	229	6,955	61	61,500	...	...
1889-90	133	5,950	80	81,480	41	1,570
1890-91	595	23,031	107	1,10,750	...	..
1891-92	545	20,230	121	1,43,450	...	...

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